

5. The System Management Environment

The System Management Environment within ECS is very extensive. The system must be capable of supporting a large number of functions from performance and fault monitoring through to billing & accounting services. This is achieved by providing a collection of tools available to the DAAC Operations through a desktop. Wherever possible established COTS have been identified to perform the core of the functionality, and where necessary the COTS packages have been wrapped to provide the desired level of interoperability.

In this Section the pattern established in Section 4 is followed. First the tools environment is outlined (Section 5.1), followed, in Section 5.2, by identifying several key scenarios to show how the various tools interact to perform the necessary tasks.

5.1 System Management Tools Overview

Figure 5.1-1 identifies the services and tools available to the DAAC Operations to perform System Management activities.

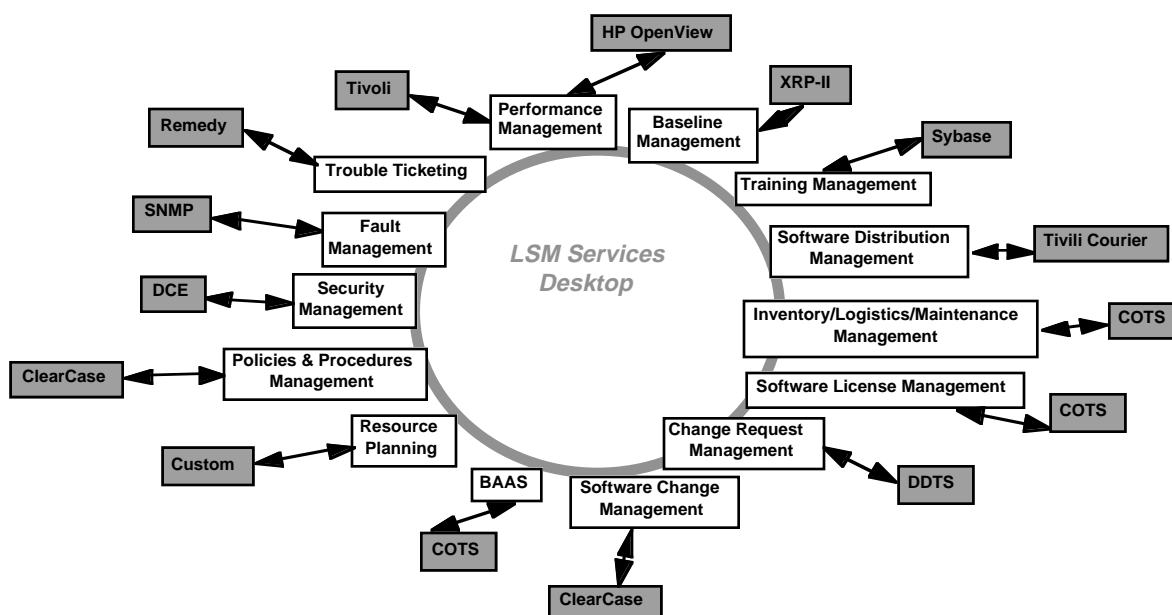


Figure 5.1-1. System Management Desktop Environment

5.1.1 Fault Management

The Fault Management Application Service provides the capability to detect, diagnose, isolate and recover from faults that occur in the managed objects within ECS. The entities or managed objects

in ECS that need to be monitored for faults include network devices (such as hosts, hubs and routers), systems software (databases and middleware such as DCE) and applications (such as the Planning Subsystem and the Data Server Subsystem). Fault Management encompasses activities such as the ability to trace faults through the system, to execute diagnostic tests, and to initiate corrective or recovery actions upon the isolation of errors in order to correct the faults. The detection of faults involves the identification of an unacceptable change in the state of a managed object. The diagnosis and isolation of a fault involves the determination of the cause of the fault from the correlation of recorded symptom using HP Openview and Tivoli and where necessary, through the use of diagnostic tests. The recovery from a fault condition involves the initiation of a corrective action in order to restore the system to normal operational status.

The Fault Management Application Service has two instances: at each of the DAACs and at the SMC. The Fault Management Application Service resident at each DAAC collects and operates on fault data local to the site. Summaries of this data are sent periodically to the SMC. The SMC Fault Management Application Service operates on these summaries of fault data collected system-wide by Fault Management Application Service at the various DAACs in order to perform system-wide fault trends analysis.

The Fault Management Application Service at each DAAC provides the capability to generate notifications of fault conditions and alert indicators in the event of defined thresholds being exceeded. It provides diagnostic information and the diagnostic tests that facilitate the isolation, location and the identification of the cause of the faults local to the DAAC. It further provides the mechanisms for the generation of notifications upon the detection of faults, and the mechanisms for the definition of automated actions to be executed in response to the occurrence of well-defined faults or events. The DAAC Fault Management Application Service, provides the mechanism to generate reports based on information in its database. The Fault Management Application Service at each site, sends summary data periodically to the SMC for trends analysis.

Since a fault is an unacceptable change in the state of a managed object, it follows that the Fault Management Application Service provides for the detection of changes in the state of managed objects in order to be able to distinguish the unacceptable changes that constitute faults from acceptable changes. The Fault Management Application Service, therefore, provides the capabilities for real-time configuration management to include the startup, shutdown and discovery of ECS applications. Further, since the service maintains the status of resources, it provides the capability to provide the status of these resources, such as processors and associated disks, upon requests from subsystems such as the Planning Subsystem.

The SMC Fault Management Application Service provides the mechanism to receive notifications of fault conditions from the Fault Management Services at the DAACs. This is expected to facilitate the coordination of the isolation, diagnosis and the resolution of multi-site and system-wide faults, disruptions, and security events such as break-in attempts. This may, in some cases, include coordination with external providers for the analysis and recovery from fault conditions. The SMC Fault Management Application Service provides the mechanism to generate reports based on the information it collects and receives from the various Fault Management Application Services at the DAACs.

Faults in hardware devices are detected and reported through the use of a combination of the industry standard Simple Network Management Protocol traps and IP status polling. Faults in

software are reported by the Management Agent Services. ECS applications may report faults to the Fault Management Application Service through the use of a public class within the ECS Process Framework and the Management Agent Service. The Overview Design Specification (305-CD-020-001) provides the context and the criteria for ECS applications to use the Process Framework to report their faults. The Fault Management Application Service provides for the notification of any type of event associated with a managed object through the public classes exported by the Management Agent Services and the Process Framework.

5.1.2 Trouble Ticketing

The Trouble Ticketing Service (TTS) provides the DAACs a common environment and means of classifying, tracking, and reporting problem occurrence and resolution to both ECS users and support staff members. TTS's core functionality is provided by the Remedy Action Request System, a COTS product. Through the configuration of this product, TTS will:

- provide a graphical user interface for support staff members to access all TTS services
- include a definition of the common trouble ticket entry format
- store trouble tickets
- retrieve trouble tickets through a wide variety of criteria (ad-hoc queries)
- provide the ability to “forward” problems from one DAAC to another (or DAAC to SMC)
- produce stock and common reports
- interface with the common e-mail environment to provide automatic notification to users and support staff members
- offer an application programming interface through which applications could submit trouble tickets
- provide summary information to the SMC from each DAAC to allow trend reports regarding trouble tickets.
- define a consistent “life-cycle” for trouble tickets (through a set of standard status codes and escalation and action rule definition)
- allow each DAAC a degree a customization through definition of further escalation and action rules

Escalation rules are simply time activated events which execute on trouble tickets which meet a set of specified criteria. Actions which can be taken include notification (of either a user or support staff member), writing to a log file, setting a field value on the trouble ticket, or even running a custom written process. Qualifications can be expressed on any trouble ticket data TTS tracks. Examples of custom escalation rules might include:

- if a “High” priority trouble ticket stays in “Assigned” for more than 48 hours without being moved to “Solution Proposed”, re-notify the assigned support staff member
- if a “Low” priority trouble ticket is not moved to “Closed” within 14 days, raise the priority to “Medium” and re-notify the assigned support staff member

Active links are similar to escalation rules with the exception that they are defined to take place on a specified action rather than at a given time. Examples of custom active links which can be defined by a particular DAAC include:

- if a high priority trouble ticket is closed with a particular resolution code, notify a specified member of the support staff (perhaps a manager)

In addition to the functionality provided by Remedy, TTS will utilize a set of custom HTML documents to provide users with the ability to submit new trouble tickets and query the current status of any of their previous entries. Access to TTS through this technique will provide users an easy method for reporting problems in an environment with which most are already familiar. Additionally, as another means of trouble ticket entry, the TTS will provide a textual e-mail template through which automated entry of trouble tickets is also possible. Finally, support staff members are able to enter trouble tickets through the Remedy provided interface for problem received via other methods (e.g. phone calls).

In addition to tracking Trouble Tickets, the Remedy ARS will also function as the User Contact Log. Remedy will be configured to have a separate schema that will contain the entries that User Services personnel enter for each contact that they receive from a user. The User Contact Log will also allow a trouble ticket to be initiated from a log entry with the push of a button - the trouble ticket will be populated with information from the contact log.

5.1.3 Performance Management Application Service

The Performance Management Application Service provides the capability to continuously gather statistical and historical data on the operational states of applications, operating system resources and network components, to analyze the data collected by comparing with established criteria, adjust measurement criteria or initiate other corrective actions as necessary in order to ensure an optimal utilization of resources. The service allows for the benchmarking and trends analysis of network component performance, in addition to collecting performance data on scientific algorithms. The Performance Management Application Service has two instances: one at each of the DAACs and one at the SMC. The site Performance Management Application Service collects and processes performance data local to the site.

Site performance management data is periodically summarized and sent to the SMC for analysis by the SMC Performance Management Application. The SMC Performance Management Application Service, which has capabilities similar to those of the site Performance Application Services, operates on performance data collected system-wide by the various site Performance Management Application Services in order to evaluate system-level performance and system-wide trends. In addition, the SMC Performance Management Application Service is also capable of connecting directly to each of the DAACs as required to monitor the performance of site elements.

For Release B, the Performance Management Application Service will consist mainly of two COTS applications, HP OpenView and a separate COTS Performance Management Application, Tivoli . Table 5.1.3-1 provides an indication of responsibility between HP OpenView and the COTS Performance Application for providing performance management of the various ECS managed objects.

Table 5.1.3-1. Performance Manager by Managed Object Table

Managed Object	Performance Manager
Hosts	HP OpenView
Routers	HP OpenView
Hubs	HP OpenView
Gateways	HP OpenView
FDDI links	HP OpenView
Ethernet links	HP OpenView
ECS Applications	Tivoli
Operating systems	Tivoli
File systems	Tivoli

HP OpenView provides operators to specify, for each managed object, the following information:

- Performance attributes to be collected.
- Frequency of performance attribute data collection.
- Threshold(s) which indicate degraded performance condition(s)
- Performance attributes to be logged.

The COTS Performance Application, Tivoli, provides similar monitoring capabilities for applications and operating systems. In addition, the performance management application service must also monitor ECS-specific metrics for ECS applications. This information will be collected by management agent services and stored in a history log. The operator will be given an interface to the management agent for performance management reasons to set polling intervals and application thresholds. The operator can access this ECS-specific data by browsing the logs or by generating reports from the management RDBMS.

5.1.4 Security Management

The Security Management Application Service provides for the management of the security mechanisms that are used to protect and control access to ECS resources. It provides the rules and the implementation for authentication procedures, the maintenance of authorization facilities, the maintenance of security logs, intrusion detection and recovery procedures. The mechanisms used to provide security in ECS comprise three distinct parts: network security, distributed communications security, and host-based security.

Network security management involves the management of routing tables used for address-based filtering (network authorization). This is implemented through router COTS configuration files through which access control rules are specified.

Distributed communications security addresses communications between software entities such as clients and servers employing mechanisms such as Kerberos/DCE for real-time authentication exchange. The management of distributed communications security involves the management of the authentication database (the DCE registry database) and the authorization database (DCE Access Control List Managers). This is managed through the use of Hewlet Packard's acctmgr tool.

The acctmgr tool is a COTS product that provides a Motif-based capability to administer the DCE security registry (authentication database), and the access controls on cell resources (authorization database). The acctmgr is part of HP's DCE Core Services.

Host-based security management addresses the control of access to and the protection of these mechanisms, in addition to the management of compliance to established security policy (e.g. password usage guidelines), and intrusion detection (e.g. break-ins). Access control to network services is implemented through TCP wrappers, a public domain tool. Compliance management is implemented through public domain products npasswd, crack, and SATAN. Intrusion detection is implemented through the public domain product Tripwire, and custom development.

The Security Management Application Service has two instances, the site and the SMC Security Management Application Services. The site Security Management Application Service manages security databases local to it, manages compliance to security directives and guidelines established and disseminated by the SMC, performs intrusion detection checks in order to maintain the integrity of ECS resources, provide the capability to analyze security audit trails, and provide the mechanisms to generate reports for such these activities. The SMC Security Management Application Service is responsible for establishing and disseminating security guidelines to the sites, disseminating security advisories received from external systems (security agencies such as CERT and NIST) to the sites, receive security reports from the sites, and to receive notifications of and coordinate the recovery from detected security breaches at the sites and external systems.

5.1.5 Resource Planning

Resource Planning is supported by three tools to assist DAAC Operations:

Resource Reservation Editor

A tool used by any authorized user to request reservations on resources within a DAAC. The information expected for each request is as follows:

- Activity Type
- Brief Description
- Originator
- Origination Date
- Priority
- Start Date/Time
- End Date/Time
- Resources needed for this event
- Frequency of event

Furthermore, this same tool would be used by update the reservation when it is validated and approved or disapproved. When a resource reservation is approved, it is compared with other approved reservations to ensure there are no conflicts. If there is a conflict, the operator is notified and one of the reservations causing the conflict must be changed.

Resource Reservation Plan Timeline

This tool allows the Resource Planner to view all the resource reservations in the system. The Planner can select the option to commit the current approved resources, which brings up a timeline display of the current resource reservations and stores them for use by the Production Planning Workbench when creating production plans. At this point, the resource plan can be published to the Data Server for distribution.

Resource Configuration Editor

This tool allows the Resource Planner to ingest and then modify the resource configuration received from MSS's configuration management. This includes assigning a nominal activity to each resource, adding new resources to a plan, and deleting resources from a list.

5.1.6 Inventory/Logistics/Maintenance (ILM) Management

The Inventory/Logistics/Maintenance (ILM) Manager provides the capability for the M&O staff to manage inventory items, provide logistics management, and control maintenance. Several COTS packages are currently being evaluated under vendor proposals to satisfy the functional requirements of these three required services.

The ILM Manager can control, track, and maintain information on ECS inventory items. ECS inventory items may be ECS purchased equipment or GFE, and includes hardware, COTS software, documentation, training material, and consumable supplies. The ILM Manager's inventory activities will include maintaining an up-to-date list of all equipment items, controlled items, spare parts, and consumable supplies. Controlled items will be tracked throughout their service life until disposal. An inventory item can be made up of a combination of other inventory items (an assembly or sub-assembly). For example, an ECS workstation with a bar-code control number assigned may be comprised of a keyboard, mouse, monitor, and CPU. Each item in this example can be individually tracked within the ILM Manager, so that a monitor item can be part of a workstation and another identical monitor item can be tracked as a spare. A consumable item is one in which only the amount on-hand/ordered is maintained, and the item is removed from inventory control when distributed. For example, paper for a laser printer may be ordered by the box, and the box may have 12 reams in it. Once the box has been removed from the inventory (distributed to the computer floor for use), the number of reams left in the box is not tracked by the ILM Manager. A spare item is one which has at least one not in use and available for issue; this quantity can be queried from the ILM Manager.

The ILM Manager will track spare parts and components that are used to repair equipment end-items, consumable items (items that are used up or distributed during operations as a matter of course, such as paper and laser toner cartridges), and line replaceable units (LRU) which are returned to a third party vendor for restoration, overhaul, or other service. The ILM Manager provides the ability to do trend analysis of parts and LRU failure rates to spot trends that demand resolution. The ILM Manager will likewise track usage trends that enable the M&O Staff to set the most economical supply re-order point levels consistent with the requirements of operational readiness. Finally, the ILM Manager provides a variety of reports to enable the M&O staff to perform their varied responsibilities on a day-to-day basis.

An item tracked by the ILM Manager is composed of one or more of the following attributes, as shown on the object model: item identification, manufacturer, description, model number, part

number, version, serial number, cost, date received, component of, status, condition, location, custodian, maintainer, ECS bar-code data, maintenance agreement, license agreement, warranty list, warranty expiration, etc. The ILM Manager can add items, update items, remove items, list items according to operator entered criteria, generate reports on items based on operator entered criteria, or change the status of an item.

There will be an instance of the ILM Manager at both the SMC and at each of the sites. The ILM Manager at the SMC will provide M&O Staff a view of the system-wide inventory. The ILM Manager at each sites will provide M&O Staff a view of their respective sites inventory.

The ILM Manager's logistics activities involve the various actions to track all pertinent supplies (both consumable and non-consumable) needed for maintenance as well as routine replenishments of the system and equipment end-items (such as spare parts for maintenance, extra paper, and toner cartridges for printers).

The ILM Manager's maintenance function will provide the capability for the M&O staff to track preventive and corrective maintenance actions to completion - including the update of configuration management, logistics, and inventory records/baselines.

The ILM Manager receives from the Trouble Ticket Service initiation of corrective maintenance and preventive maintenance actions. Both types of maintenance activities can be tied to the scheduling function so that maintenance disruption to operations will be a minimum. The ILM Manager provides information on both corrective and preventive maintenance required; it also performs analysis on all corrective maintenance actions to identify site and system trends that can help to avoid future problems. The ILM Manager keeps information on inventory status changes to update the inventory as well as supply data changes (such as use of consumable supplies, line replaceable units, and spare parts) to update the respective logistics records.

5.1.7 Billing & Accounting Application Services (BAAS)

ECS operations are supported by integrated and automated billing and accounting functions. The Enterprise Monitoring and Coordination (EMC) Billing and Accounting Application Service (BAAS) provides the mechanisms for ECS to price user data orders, invoice users for data and media, and meet ECS' needs to track and to provide financial data.

One of the BAAS' primary functions is to provide bill-back capabilities. The billing and invoicing functionality allows ECS to gather and track information on science user data orders, and to cost these orders based on different costed resources (e.g., disk utilization, CPU, media, connect time) or standard product ordered using pricing algorithms associated with each one. Policy will determine what prices are applied. A standard pricing policy for ECS products across sites is assumed.

The Data Processing Subsystem (DPS) and Data Server Subsystem (DSS) will provide the BAAS with accounting and resource data for science user orders which have been fulfilled so that the data may be priced. For purposes of estimating the price of a new product request, pricing algorithms maintained in pricing tables in BAAS will be made available to the DSS.

The billing and invoicing functionality allows ECS to inform accounts of their activity during a particular billing cycle and of the charges associated with such activity. Bill Invoices will be generated monthly.

Policy may dictate that no charges be applied to any account, or to particular accounts; or that certain accounts be measured on resources consumed (e.g., number of tapes, number of images) rather than dollars. In such cases, the accounts would not receive a bill invoice but a statement of account does not anticipate payment. An account also would receive a statement of account instead of a bill invoice when the account has funds credited to it in advance of purchases of data. As charges are incurred by the account, these are deducted (debited) from the existing credits. The statements of account would show activity and balance remaining. An account's balance status also will be available for on-line consulting via the Client Subsystem (CLS).

Science user payments (made in the form of checks or purchase orders) will be credited to the appropriate accounts and deposited directly into Federal Treasury bank accounts. ECS will have the capability to issue checks to handle refund situations. To track all financial data information gathered on science users there will be accounts set up and maintained by the BAAS. Receivable accounts report on science user accounts (assets), while payables report on vendors and service providers (liabilities). A current contract to purchase consumables resides with EDS, which precludes the need for the BAAS to report on payables until this contract ends.

The BAAS COTS will provide the following major functions: Billing and Invoicing, Accounts Receivable, Accounts Payable (dormant until the EDS contract to purchase consumables ends), and General Ledger Reporting (minus cost accounting). A custom piece will be developed to provide cost accounting information gathered by the Accountability portion of MSS. The COTS will be capable of supporting the information tracking of 17,000 user accounts that are current accounts and are accessible on-line (not archived or historical). The Billing and Accounting Application package supports a minimum of 500 uniquely priced items or products. As part of the BAAS, it will provide an interface to other ECS Subsystems and Services to provide access to information such as pricing estimates and account balance data maintained within the Billing and Accounting Application package. The price estimate and account balance data supplied by the BAAS as part of a response to a query (from DSS or CLS) will reflect the same pricing and invoicing options as would be presented to a client M&O user directly accessing the BAAS COTS Package. The interface to the COTS package can be accessed directly by one of UNIX server implementations available in ECS.. In addition, the COTS package is also capable of interfacing with the ECS Sybase Management Database directly.

5.1.8 Software Distribution

Software Distribution Manager provides the capability for the M&O Staff to distribute ECS software, database information, and software documentation for ECS products and services as well as commercial software. These distributed products are tracked to insure delivery and maintain an up-to-date baseline. Tivoli Courier, a COTS product, will satisfy the functions for the Software Distribution Manager.

The service will employ a software distribution process to package, track, and distribute software, databases, and documentation for delivery to destinations at both ECS and ECS-connected sites. The process entails maintaining version-controlled repositories for toolkit software, software upgrades, and documentation. The CSS Bulletin Board Service will be utilized to provide access to the toolkit repository and information. Both automatic and operator-assisted/controlled distribution services will be provided.

The Tivoli/Courier management application helps the M&O Staff distribute and manage software across a multi-platform network. It provides an efficient method for distributing, installing, and controlling software across the network. Typically, users working on a networked system maintain a large stock of software applications and tools. Tivoli/Courier enables a centralized software management capability to add new applications, update existing software with newer versions, and synchronize software on distributed systems.

5.1.9 Training Management

The Training Management Service supports training programs for ECS employees, as well as certification programs for ECS M&O personnel. The purpose of this Service is to ensure that each employee receives the proper amount and type of training in accordance with their job description. The Service will be managed by members of the M&O staff by utilizing a Sybase database.

The Training Management Service receives training requirements, specific to each job description, and resource requirements from M&O personnel. Based on these requirements and the availability of the resources, which is determined by making a request to the Resource Planner, the Training Service supports the development and maintenance of training materials (through OA tools) and schedules. The database containing the training information will be local to the SMC, as well as to each DAAC, thus allowing them to retrieve the information they require. This database will be automatically replicated by Sybase at a user-specified interval.

Training courses are grouped into curricula for the M&O personnel certification process. In order for an M&O employee to become certified in a particular subject area, the curriculum in that subject area must be completed and a certain level of proficiency must be met. The Training Service maintains and updates each M&O employee's certification, as they must be recertified every so often for reasons such as a change in technology, the certification has expired, or possibly a lack of adequate performance. The Service also supports course evaluations, which are available for review and processing.

5.1.10 Policies & Procedures Management

The Policies and Procedures Management service includes providing methods to perform ready access and lookup to the policies and procedures established by ESDIS. Policies and procedures, when applied uniformly, ensure that all M&O Staff actions will be standard across sites. Policies are instituted to determine how M&O Staff should manage a situation. Procedures are established to communicate to M&O Staff how to perform procedural actions. The functions of the Policies and Procedures Manager will be satisfied by reusing the Document Data Server, Ingest, Client, and by using the bulletin board service. Also, the policy and procedures documents will be stored in ClearCase for Configuration Management of the documents.

The Policies and Procedures Management Service will provide the capability to prepare, store, maintain, and make available for distribution ECS policies and procedures as well as site specific policies and procedures. The Service will also post to the bulletin board service information on ECS status, events, and news.

5.1.11 Software License Management

The Software License Management service provides the capability for the M&O Staff to monitor and administer the licensing aspects of COTS software.

This service maintains current licensing information on all COTS products managed by ECS. This information includes product identification, server location, licensing provisions such as expiration date, and number of users. The service supports the creation, installation, reinstallation, update, and distribution of licenses and associated provisions for all ECS servers.

The Software License Management service monitors and collects utilization statistics on licensed software; detects and notifies M&O staff of significant licensing events including grants, releases and imminent expirations; and reports on collected statistical information to assist M&O Staff in analyzing trends in licensed product usage.

The COTS software chosen for the Software License management supports heterogeneous networks, provides reliability in the event of server node failure, provides optional enforcement of expiration dates for demonstration copies and maintenance releases, supports queuing of license requests, supports floating and node-locked licenses, and provides transparent reconnection of applications when their daemon process becomes unavailable, including conditions of server node failure.

5.1.12 Change Request Management

The Change Request Manager provides all the functionality necessary to compose, submit, coordinate, and track status of proposals to change ECS resources. Its core functionality is provided by the COTS - Distributed Defect Tracking System or DDTS. The Change Request Manager, is an interactive, transaction-oriented application. This client/server application supports the following enhanced features:

- Resource Change Request Definitions - customization of COTS-provided specifications for resource change request records.
- Resource Change Request Input Forms - customization of COTS-provided screens and triggers to accommodate customized resource change requests.
- GetVerification Script - custom coding in native COTS language to service calls for evaluations of specified conditional expressions on resource change request records.
- GetRequestList Script - custom coding in native COTS language to service calls for values for specified attributes of specified resource change requests.
- Mail-related Triggers - custom coding in native COTS language that implement notification policies.
- *DDTS* Pre-defined Reports - Custom coding in native COTS language or customization of COTS-provided specifications for the following menu-selectable, pre-defined reports:
 - Change Request Report
 - Change Request List
 - Change Request Metrics Report
- System Management Triggers - Custom coding in native COTS language to invoke MACI-provided objects that report application events and handle system management callbacks.
- *DDTS* Proxy Agent - customization of Management Agent CSCI's proxy agent. C++ code for interacting with application management agents.

5.1.13 Software Change Management

The Software Change Manager provides all the functionality necessary to version control files containing custom software, data, and documentation. *ClearCase*, a COTS application, will perform the Software Change Manager function. This client/server application provides extensive library management facilities, and also supports the following enhanced features:

- Library Installers - customization of COTS-provided scripts and specifications to initially configure a software library, including establishing physical file storage locations, creating storage directories, and defining standard attributes that will be maintained for files stored in the library.
- Library View Files - customization of COTS-provided specifications for initial and default views of library objects. This include defining commands to set up a view(s) for group use, naming the view(s), specifying the location for the view storage directory, creating view storage directory, and setting up view for a default set of files.
- File Checking Trigger - custom coding in native COTS language to enforce file change policies. This trigger monitors the “check-in of files” oriented operations. The trigger executes a script which ask for a CCR/NCR/DR number that's associated with the file being checked in, calls DDTS to verify the number (if not previously verified), evaluates the code returned from DDTS, allows check-in of the file if the return code indicates number is valid, rejects check-in of the file if number is invalid and provides reason for the rejection.
- File Checkout Trigger - custom coding in native COTS language to enforce file change policies. This trigger monitors the “check-out of files” oriented operations. The trigger executes a script which ask for a CCR/NCR/DR number that's associated with the file being checked out, calls DDTS to verify the number and its association with the requested file, evaluates the code returned from DDTS, allows check-out of the file if the return code indicates number is valid, rejects check-out of the file if number is invalid and provides reason for the rejection.
- XRP-II Interface Script - custom coding in native COTS language to service calls from the Baseline Manager. This script uses the parameters passed from the Baseline Manager to locate specified software file(s) in the software library, gets the file(s) attributes values and place values in a formatted file.
- *ClearCase* Pre-defined Reports - custom coding in native COTS language or customization of COTS-provided specifications for the following menu-selectable, pre-defined reports:
 - Software Library Objects Report
 - Software Library Builds Report
 - Software Library Version Tree List
 - Software Library Registered View List
 - Software Library View Specification List
 - Software Library Checkouts List
 - Software Library Event History List

- System Management Triggers/Scripts - custom coding in native COTS language to invoke MACI-provided objects that report application events and handle system management callbacks.
- *ClearCase* Proxy Agent - customization of Management Agent CSCI's proxy agent. C++ code for interacting with application management agents.

5.1.14 Baseline Management

The Baseline Manager provides all the functionality necessary to record and track what resources constitute ECS operational baselines system-wide. The Baseline Manager is a transaction-oriented, data-intensive application that will likely perform many more queries than updates. Data store operations are relatively infrequent and accomplished largely interactively by a CM specialist using a keyboard alone for direct data entry or together with files containing formatted data from other applications such as *ClearCase* or a Baseline Manager at a different site.

XRP-II, a COTS application, will perform the Baseline Manager functions. The manager consists of COTS clients and servers for the following features have been added:

- Profile Definitions - customization of COTS-provided specifications for baseline manager's records, for baseline profiles, document profiles, and resource profiles
- Profile Input Forms - customization of COTS-provided screens and triggers to accommodate customized profile records
- Profile Import Script - custom script to facilitate adding formatted file data into the baseline manager database
- Profile Export Script - custom script to facilitate producing formatted file data from the database
- Profile Update Triggers - custom coding in native COTS language that implements procedural rules and efficiencies such as automatic carry forward of resource profile links when a new baseline profile is created; specific triggers with identified when a COTS product is selected
- XRP-II Pre-defined Reports - custom coding in native COTS language or customization of COTS-provided specifications for the following menu-selectable, pre-defined reports:
 - Configured Articles List
 - Baselined Documents Report
 - As-Built Resource List
 - Baseline Manager Profiles Report
 - Baseline Change Report
- System Management Triggers - custom coding in native COTS language to invoke MACI-provided objects that report application events and handle system management callbacks.
- XRP-II Proxy Agent - customization of Management Agent CSCI's proxy agent. C++ code for interacting with application management agents.

5.1.15 Report Generation

The Report Generation Service provides M&O staff with access to management information across all areas of the ECS enterprise and DAAC operations. Ad-hoc reports and queries are supported through the COTS reporting/query tools associated with the management database and through management application-specific COTS tools. An HTML-based user interface supports convenient access to routinely generated reports.

The primary user of the Report Generation Service is the ECS/DAAC manager or member of the M&O staff responsible for monitoring and evaluating trends in system performance, workload, capacity utilization, security, reliability, and user satisfaction. The Report Generation Service provides for the generation of a range of standard management reports. A standard report, also referred to as a canned report, is one for which a template specifying format and content has been previously defined and saved. These standard reports are maintained by M&O database specialists. Standard reports can be run automatically on a periodic basis (e.g., daily, monthly, quarterly) based on setup parameters associated with the report. ECS management and M&O personnel can access these reports for viewing from their desktop through the HTML-based user interface. Optionally, they can apply time and domain scope to the standard report templates to generate ad-hoc reports. Data underlying reports can be saved in text format for import into an analysis tool such as a spreadsheet.

In support of the data specialist on the M&O staff, the Report Generation Service provides a workbench for use in constructing ad hoc reports/queries and for maintaining the complement of standard management report templates. This workbench consists of a report writer COTS package associated with the management RDBMS and a statistical analysis COTS package providing tools for analyzing performance trends.

Report Generation Services are accessible only by M&O personnel. In general, the default scope of reports at the SMC include all of the ECS enterprise whereas the scope at an LSM is the local management domain.

5.2 System Operations Drill Down Scenarios

This section provides 6 detailed scenarios focused on System Operations and its role in supporting the overall system integrity. Like User Services, System Operations will vary considerably from DAAC to DAAC, not only in the tasks being performed, but also in the methods, and the number of people involved. For example at a smaller DAAC a number of the roles may be supported by a single person, where at a large DAAC a single role may be supported by more than one. For this reason we have concentrated upon the role, and not staffing of that role.

5.2.1 System Administration (Restore)

The DAAC System Administrator performs system maintenance and administration for all hosts and workstations, including trouble-shooting, preventive and general system maintenance. When a system problem occurs, the system administrator uses all available tools to trouble shoot and resolve the problem. All system problems encountered are logged into the trouble ticket system, Remedy.

5.2.1.1 Description

This scenario describes the occurrence of a fatal error within Remedy. In order to fix the problem, a configuration file must be restored from the previous days backup. After restoring the file, Remedy is successfully restarted and a trouble ticket is filled out and closed.

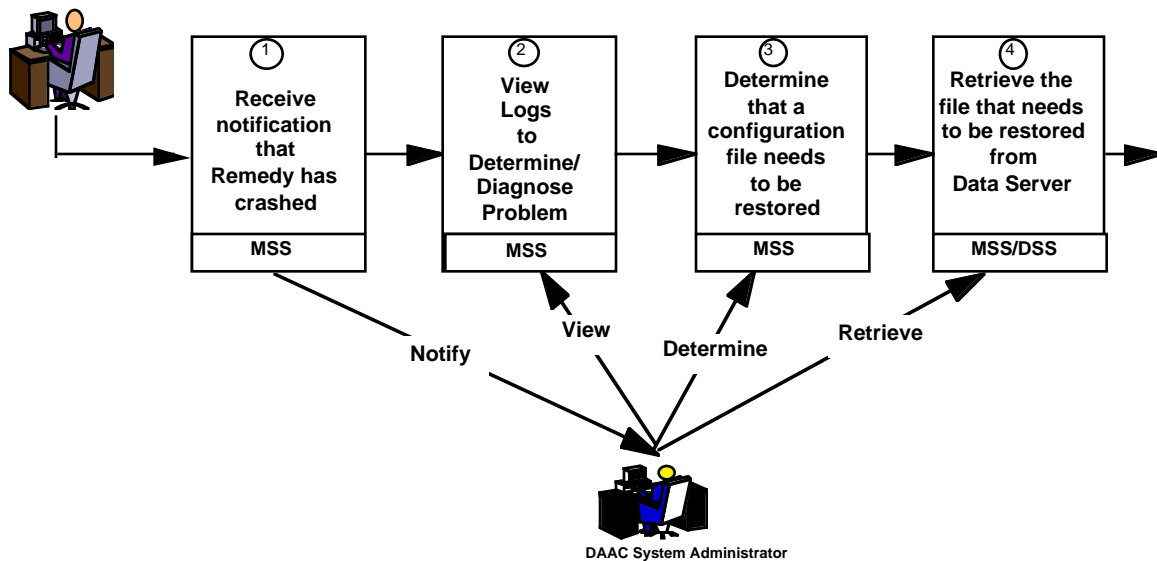


Figure 5.2.1.1-1. System Administration Restore Functional Flow (1 of 2)

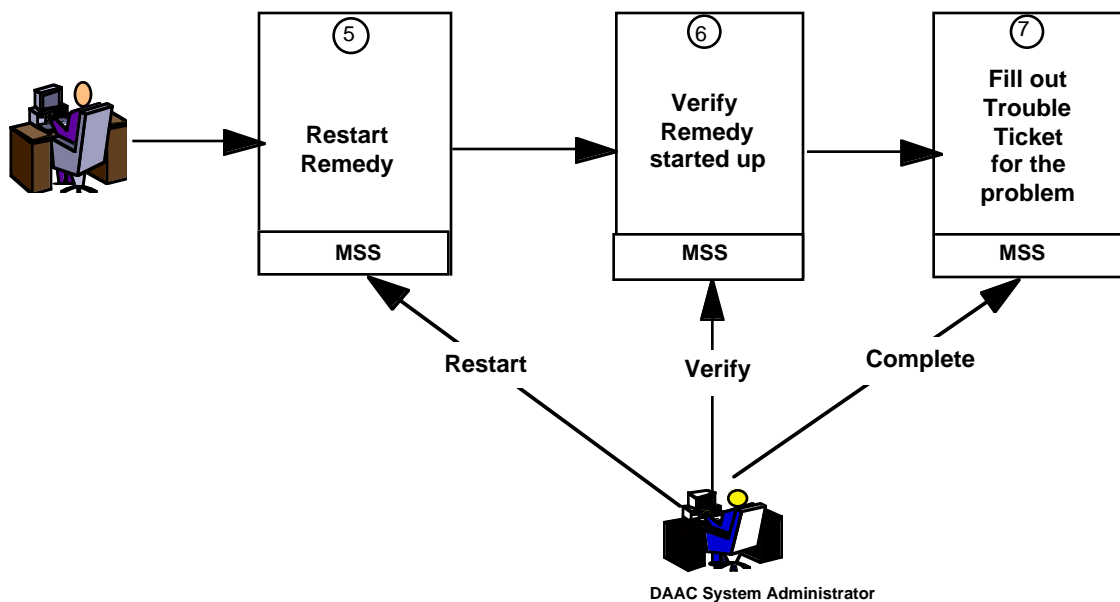


Figure 5.2.1.1-2. System Administration Restore Functional Flow (2 of 2)

5.2.1.2 Operator Roles

System Administrator - Monitors host processors. Responds to system error messages, investigating for further information on potential causes and solutions, discovering which file is corrupted. Retrieves backup of necessary files from the Data Server, replacing the corrupted file and restarting software. Fills out and closes a trouble ticket to log the problem and its solution.

5.2.1.3 Points of view

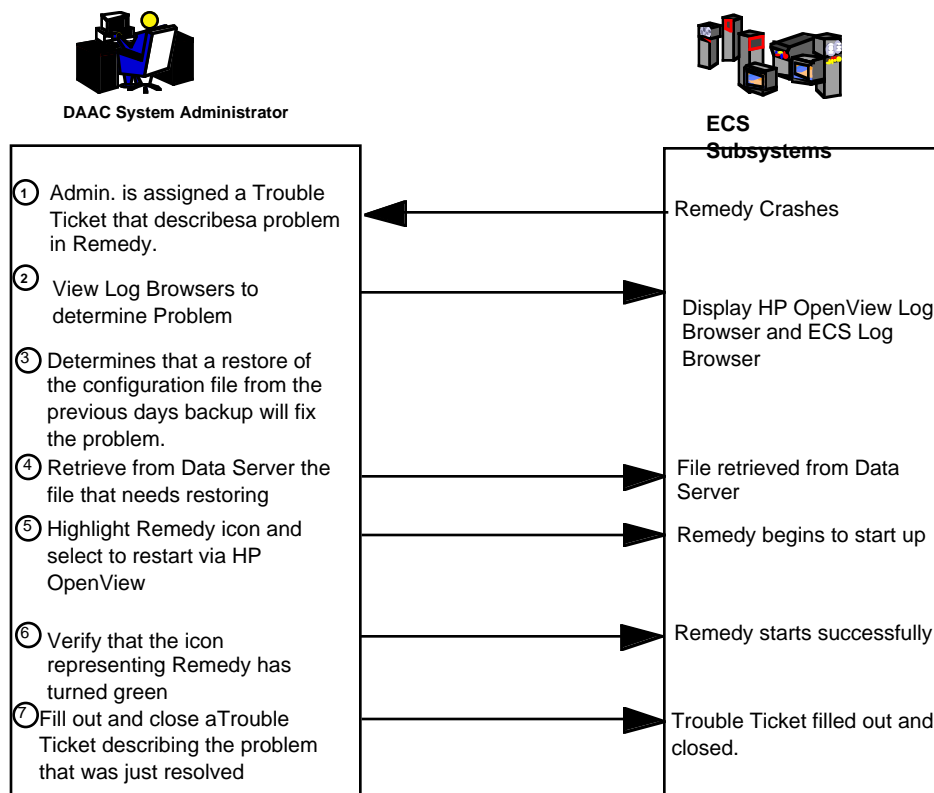


Figure 5.2.1.3-1. System Administration Restore Points of View

This section is continued on the next page.

5.2.1.4 System Administration Restore Workflow

Workflow

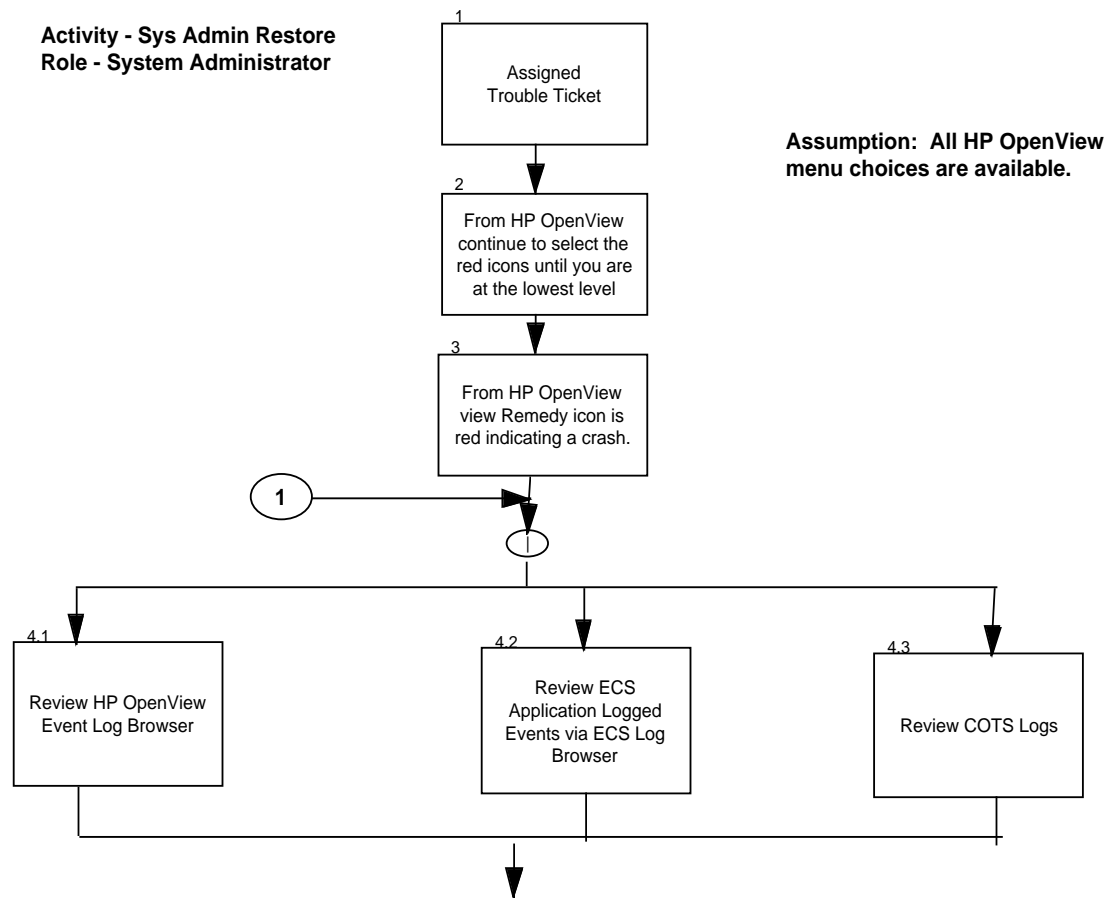
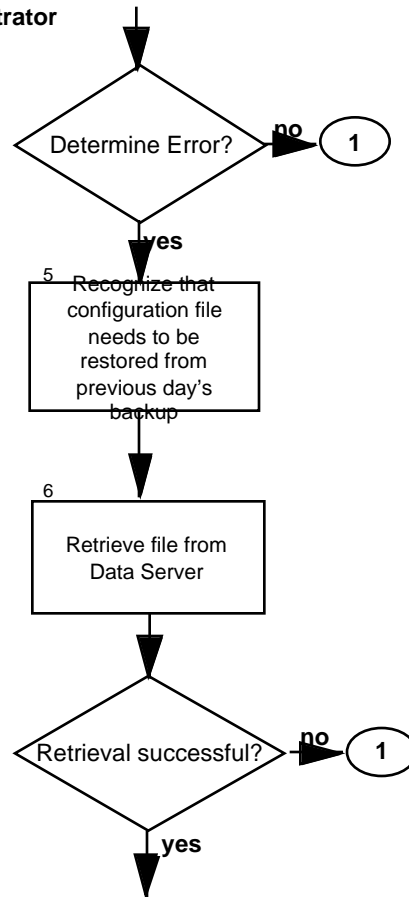


Figure 5.2.1.4 -1. System Administration Restore Workflow (1 of 3)

Activity - Sys Admin Restore
Role - System Administrator



Assumption: All HP OpenView menu choices are available.

Figure 5.2.1.4 -2. System Administration Restore Workflow (2 of 3)

Activity - Sys Admin Restore
Role - System Administrator

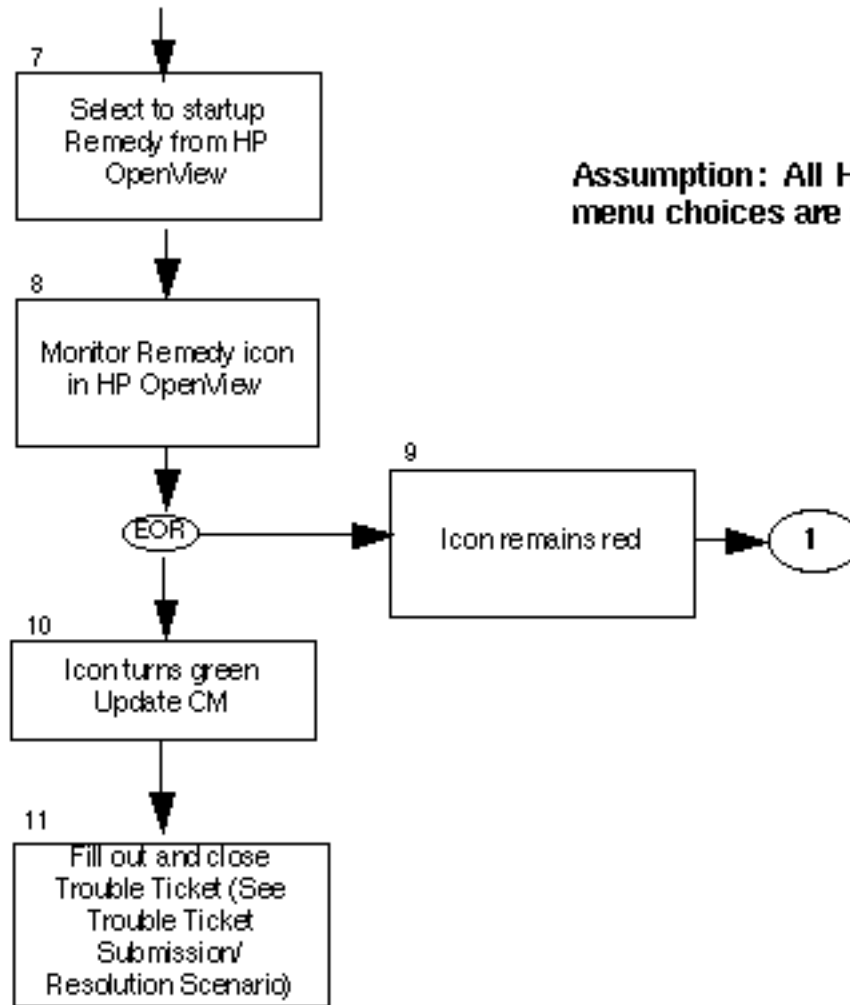


Figure 5.2.1.4 -3. System Administration Restore Workflow (3 of 3)

Data Activity

Table 5.2.1.4-1. Data Activity for System Administration (1 of 2)

Object Name	Data Element	Activity								
		1	2	3	4.1	4.2	4.3	5	6	7
Management Framework	icons	D	I	D	D	D				I
Management Framework										
MsMdUser Interface										
UNIX Editor/CAT Cmd	Log Selectection				I	I	I			
	ECS error id					D		D		
	ECS error text					D		D		
	OpenView Event Log				D	D		D		
UNIX CAT Cmd	COTS error text						D	D		
	COTS error ID						D	D		
Backup/Restore COTS	file name								I	
	destination								I	
MsTtEntry	Trouble Ticket									
Software Change Manager	Filename									

Table 5.2.1.4-1. Data Activity for System Administration (2 of 2)

		8	9	10	11					
Management Framework	icons	D	D	D	D					
Management Framework										
MsMdUser Interface										
UNIX Editor/CAT Cmd	Log Selectection									
	ECS error id									
	ECS error text									
	OpenView Event Log	D	D	D						
UNIX CAT Cmd	COTS error text									
	COTS error ID									
Backup/Restore COTS	file name									
	destination									
MsTtEntry	Trouble Ticket				I					
Software Change Manager	Filename			I						

5.2.2 Failure During Startup

In order for ECS system to successfully bootup, the startup script would have to run without any errors. Using HPOV (HP OpenView), the boot sequence is monitored from the start of the script to when the system is up and running. The scripts are basically sequence command that the machine will follow during the startup process. There are scripts for each individual subsystem. Also, there is a master script that starts up all subsystems.

5.2.2.1 Failure During Startup Description

This scenario describes a failure with a COTs product during the ECS system startup script. However, when the script runs into a problem it will terminate with error messages and an event is sent to HP Openview. After reviewing the log, the problem is isolated and resolved. The startup script is then modified to run again.

Assumptions:

- The system has been gracefully shut down due to some emergency (ex. power outage).
- The system is to be started from its zero state (Power on, Operating System up, DCE, and Master Agent running).
- A startup scrip exists for each individual subsystem. Also, there is a master script that starts up all subsystems.
- The system administrator will follow a standard procedure to conduct the startup.

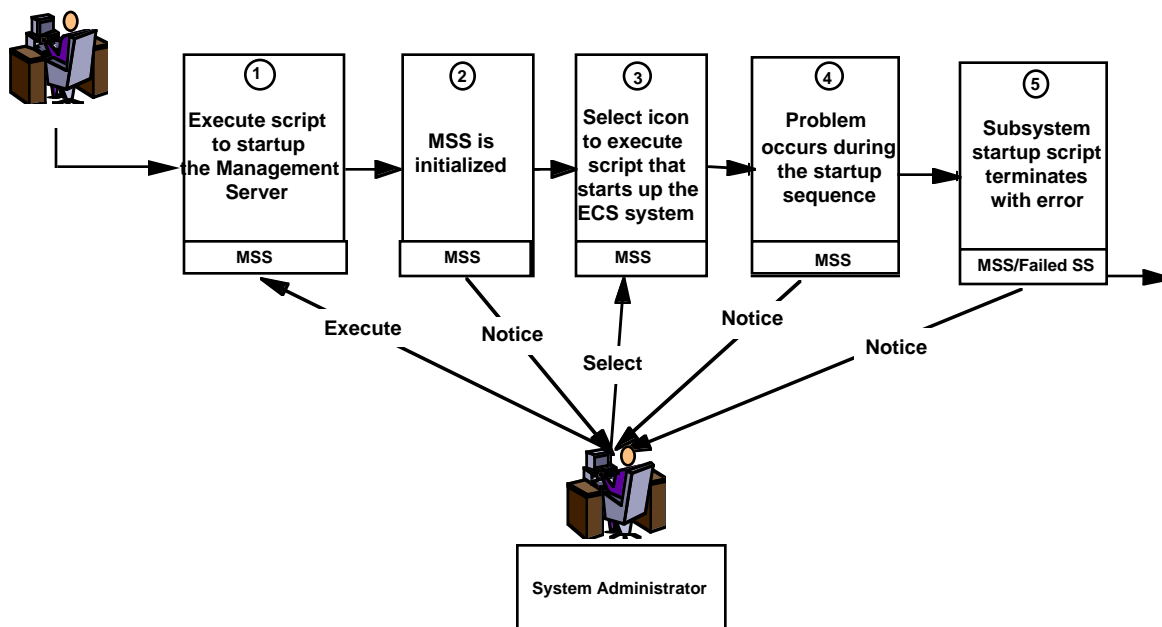


Figure 5.2.2.1-1 Failure During Startup Functional Flow (1 of 2)

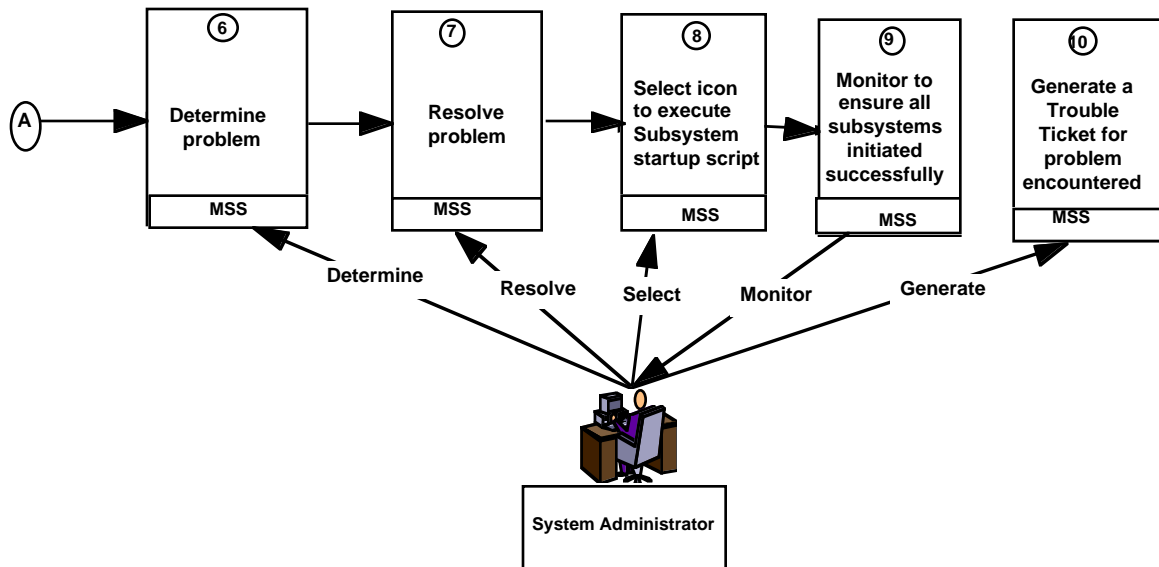


Figure 5.2.2.1-2 Failure During Startup Functional Flow (2 of 2)

5.2.2.2 Failure During Startup Operator Roles

System Administrator/Computer operator operate the host processors, support restarts/reboots, monitor system status, respond to console messages, and do initial program loads for all system upgrades. They perform minor housekeeping maintenance, operator level preventive maintenance and problem diagnosis and recovery. They administer the networked workstations supporting the M&O staff. They are responsible for executing the script to startup the Management server and to select the icon to execute the script that starts up the ECS system.

5.2.2.3 Detailed Points of View

The purpose of this Points of View is to provide an overview of steps involved in starting up the script from the master console for the MSS server and what to do in case an error occurs. It also emphasizes how a COTs product (HP OpenView) is used to start the script from the console through viewing an error message to determine the problem.

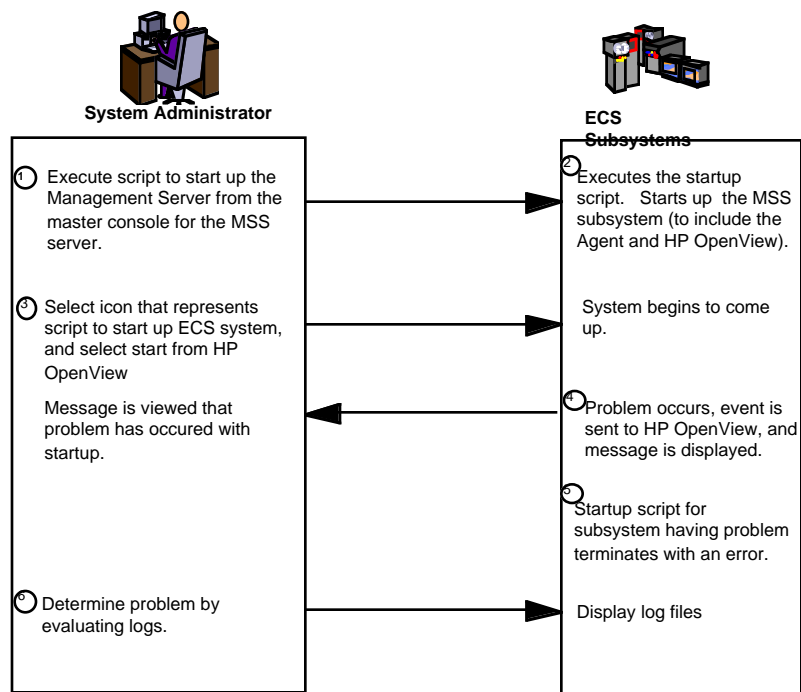


Figure 5.2.2.3-1 Failure During Startup Points of View (1 of 2)

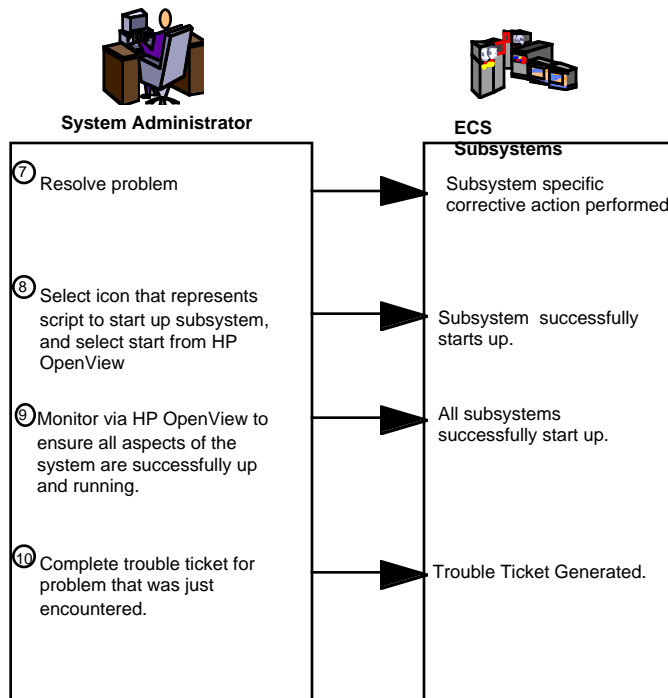


Figure 5.2.2.3-2 Failure During Startup Points of View (2 of 2)

5.2.2.4 Failure During Startup Work Flow

The purpose of this workflow is to show the steps involved during the startup process for the ECS system. The workflow is separated into two paths, either a failure during startup or successful startup.

For a failure during startup, the startup command line from the master console is executed and starts the boot process by selecting the icon representing the startup of the ECS system or the icon representing the individual subsystem. Using HPOV(HP OpenView), the icon selection is executed. During the boot sequence, the icons may turn red indicating a problem. Via HPOV, the problem is isolated and corrected.

For successful boot, the startup command line from the master console is executed and starts the boot process by selecting the icon representing the startup of the ECS system or the icon representing the individual subsystem. Using HPOV, the icon selection is executed. During the boot sequence, the color of the icon turns green which indicates everything is normal and the system boots up successfully.

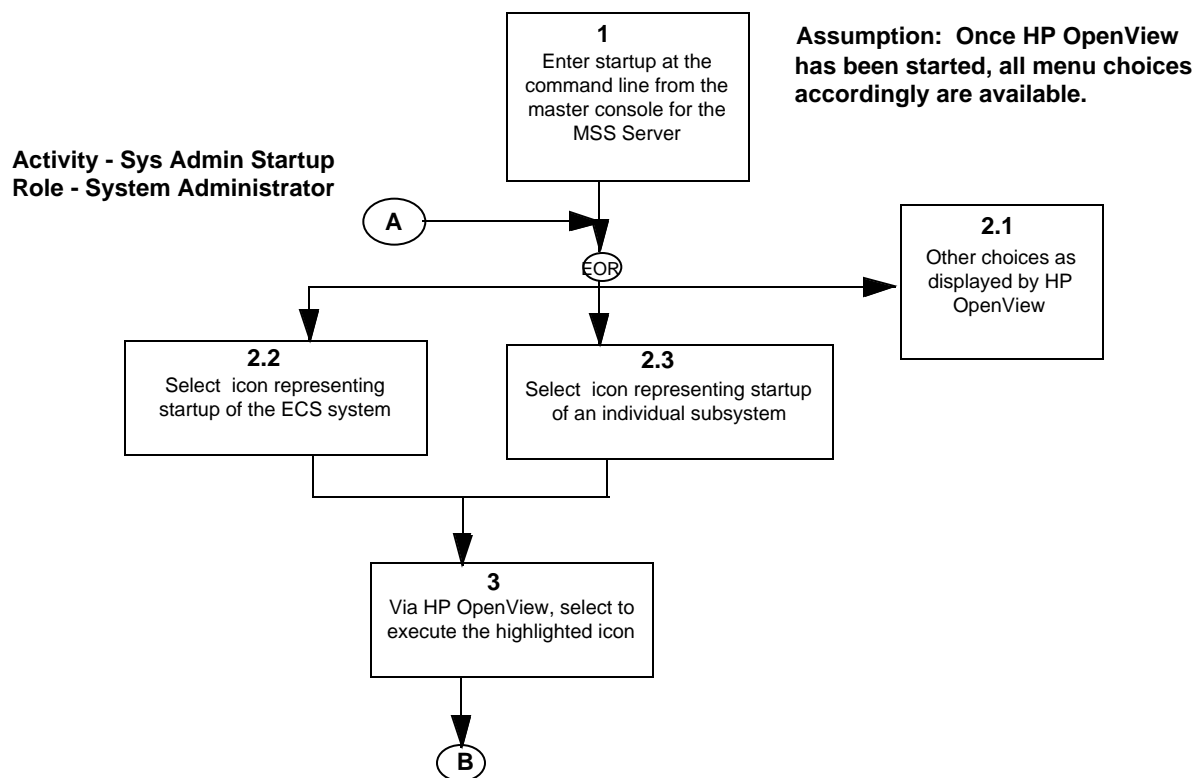


Figure 5.2.2.4 -1 Failure During Startup Workflow (1 of 4)

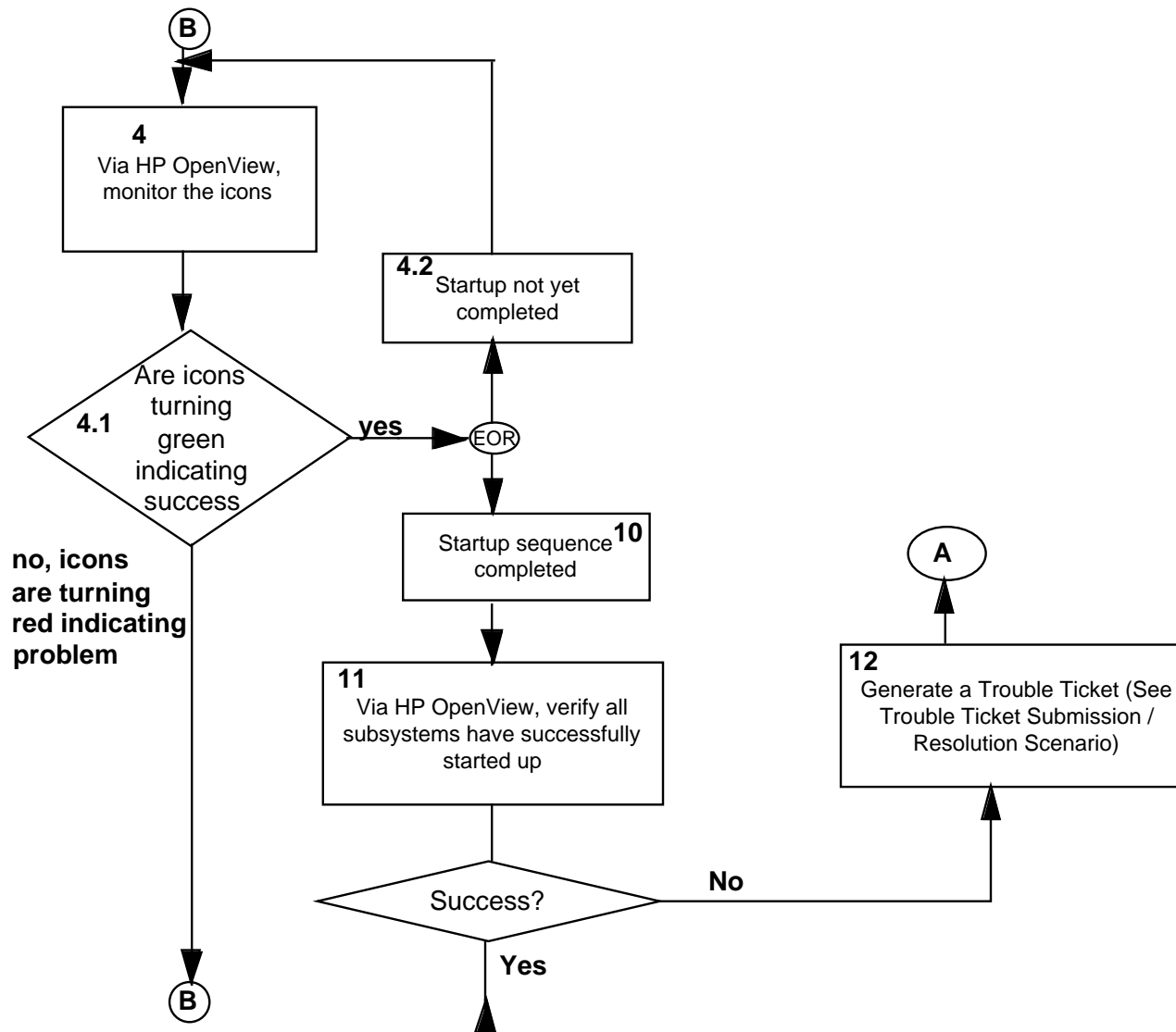


Figure 5.2.2.4 -2 Failure During Startup Workflow (2 of 4)

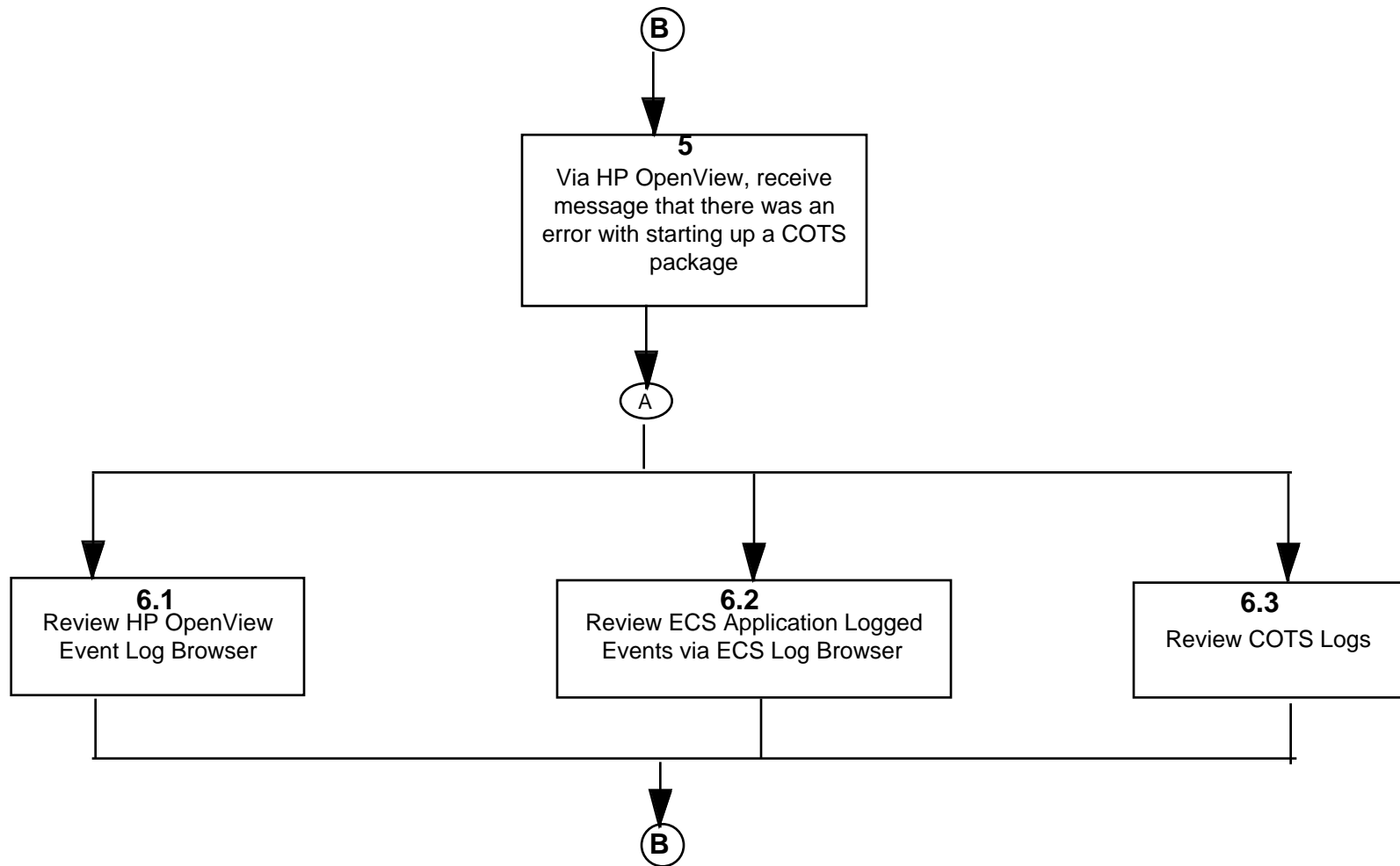


Figure 5.2.2.4 -3 Failure During Startup Workflow (3 of 4)

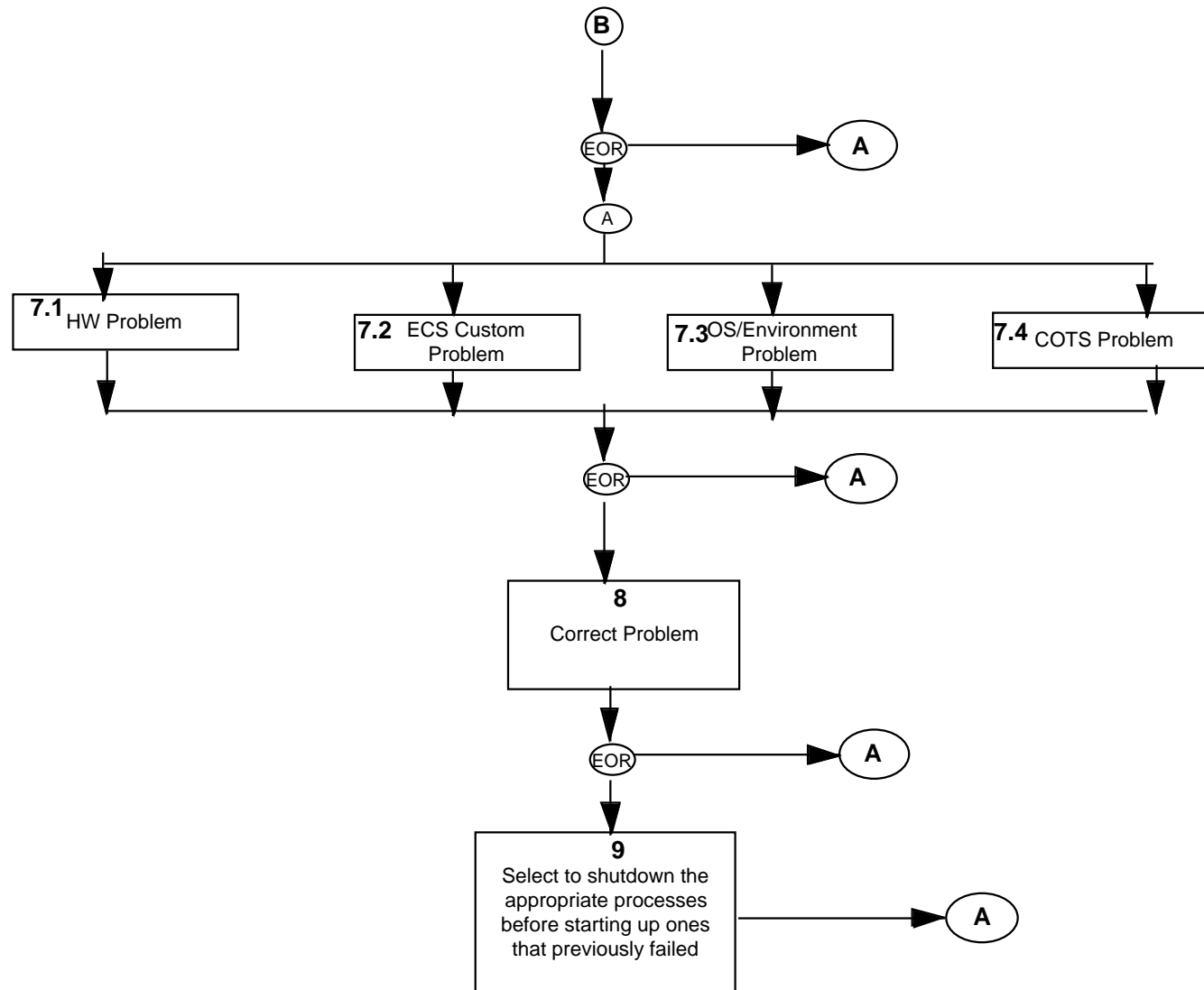


Figure 5.2.2.4 -4 Failure During Startup Workflow (4 of 4)

Table 5.2.2.4-1. Data Activity for Failure During Startup

[illegible]

5.2.3 Configuration Management - Software Transfer & Install

5.2.3.1 Description

This scenario involves transferring a Sustaining Engineer Organization (SEO)-developed software maintenance change package from the SMC to a remote site (a DAAC) and later installing the ECS custom software on a selected host computer under a configuration management controlled process. The scenario begins when the SMC Configuration Management Administrator receives the software maintenance change from the SEO and directs transfer to a designated DAAC drop-off point (SEO on-site library). At the DAAC, the installation actions are executed by the site sustaining engineering SW Maintainer under direction from the DAAC Configuration Change Board (CCB).

Assumptions

- The SMC storage software will be ClearCase.
- The baseline records will be maintained in the Baseline Manager (XRP-II tool)
- The SMC transfer software will be Tivoli Courier.
- The transfer-storage point will be the SEO on-site library.
- The Software Maintenance Change package is relatively small and requires no special build/ test procedures.
- Resource Planning, Mode Management, and other issues are not addressed in this scenario.

Scenario

- CM Process defined Changes to be incorporated by SEO into ECS Operational Baseline
- SW received at SMC from SEO CM Administrator
- Baseline changed via Baseline Manager (XRP-II tool)
- Packaged via ClearCase
- Transferred via Tivoli Courier
- DAAC CCB Approves the Installation of SW Change Package into DAAC Operational Baseline
- SW Change Package Installed at DAAC on selected host computer

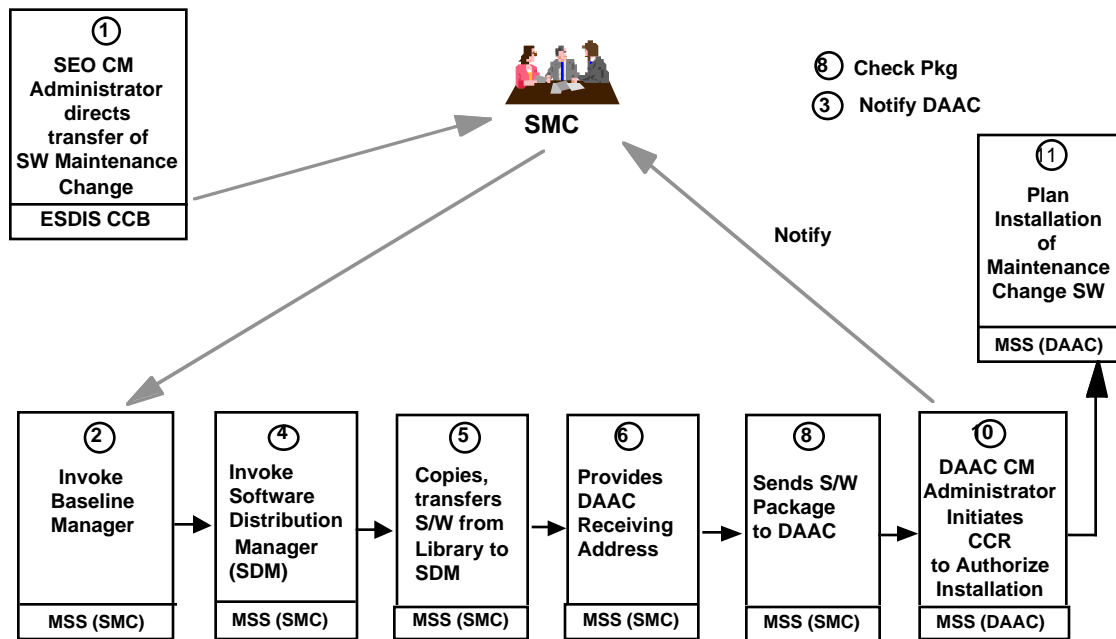


Figure 5.2.3.1-1. Configuration Management Functional Flow (1 of 2)

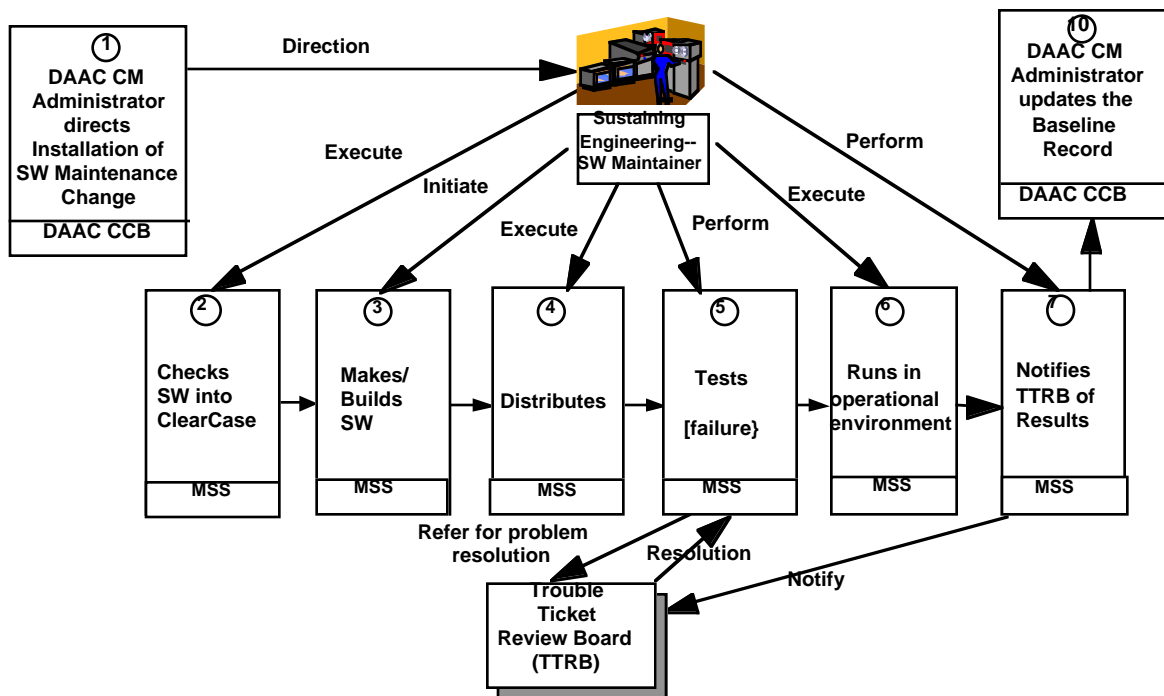


Figure 5.2.3.1-2. Configuration Management Functional Flow (2 of 2)

5.2.3.2 Operator Roles

SEO CM Administrator--Ensures that changes to the hardware, software, and procedures are properly documented and coordinated. Maintains control of all configured hardware and software.

SMC CM Administrator--Provides ECS system-wide configuration management and exercise control and/or monitoring over the configurations.

DAAC CM Administrator--Ensures that changes to the hardware, software, and procedures are properly documented and coordinated. Maintains control of all configured hardware and software. Assists in the development and administration of the library with respect to configuration management procedures.

DAAC Sustaining Engineering--SW Maintainer--Produce, deliver, and document the corrections, modifications, and enhancements made to ECS software (including COTS), and/or adapt or incorporate COTS software for ECS use.

5.2.3.3 Detailed Points of View

The following figures are a three part Point of View chart that steps through all the scenario and showing how all relevant roles interact.

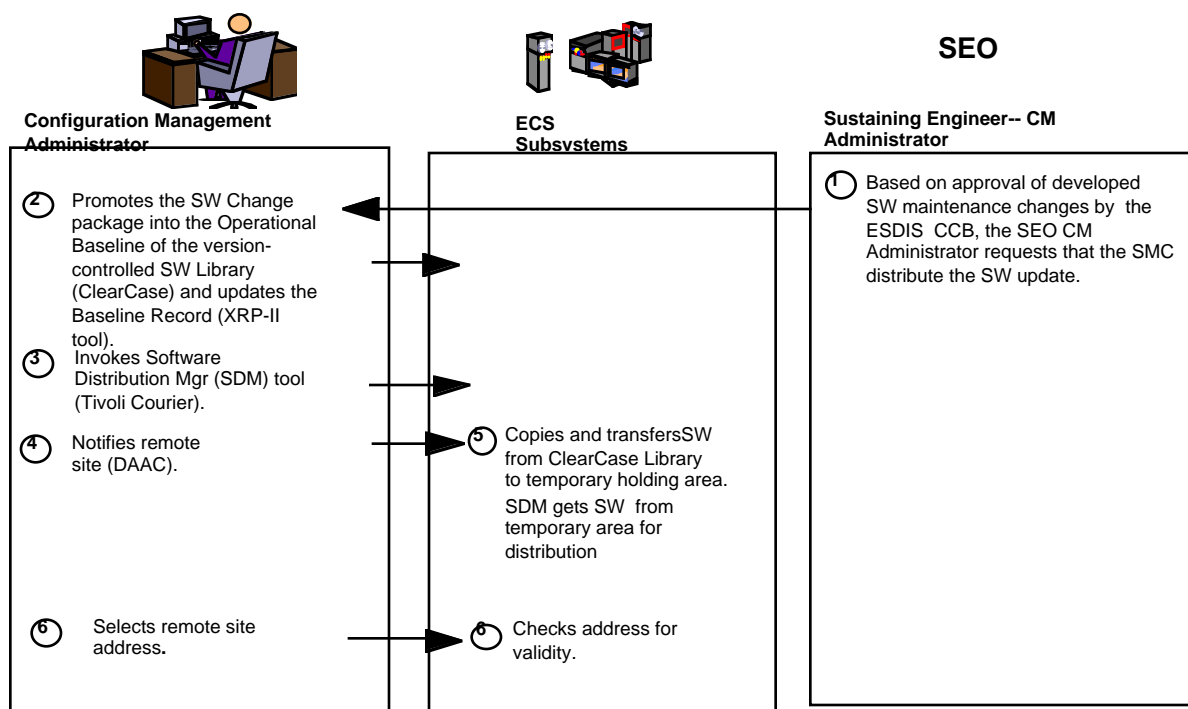


Figure 5.2.3.3-1. Configuration Management Points of View (1 of 3)

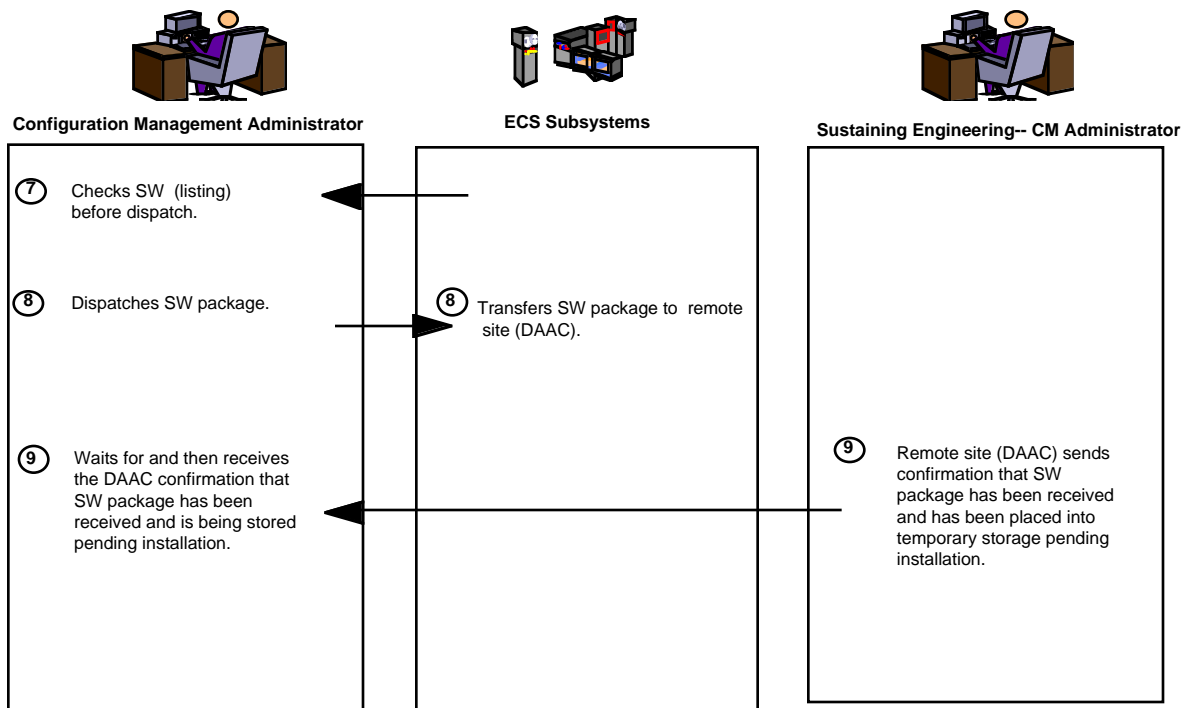


Figure 5.2.3.3-2. Configuration Management Points of View (2 of 3)

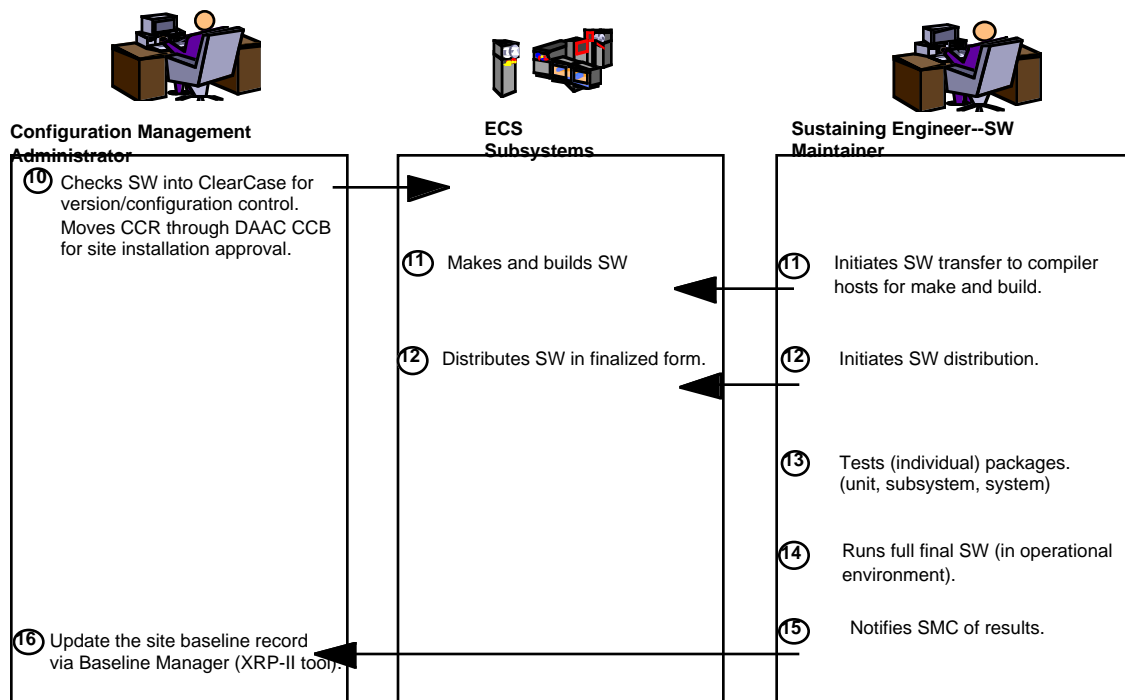


Figure 5.2.3.3-3. Configuration Management Points of View (2 of 3)

This section is continued on the next page.

5.2.3.4 Scenario Workflow

The following six figures, 5.2.3.4-1 through 5.2.3.4-6, present the detailed workflow diagrams for configuration management of maintenance SW transfer and installation.

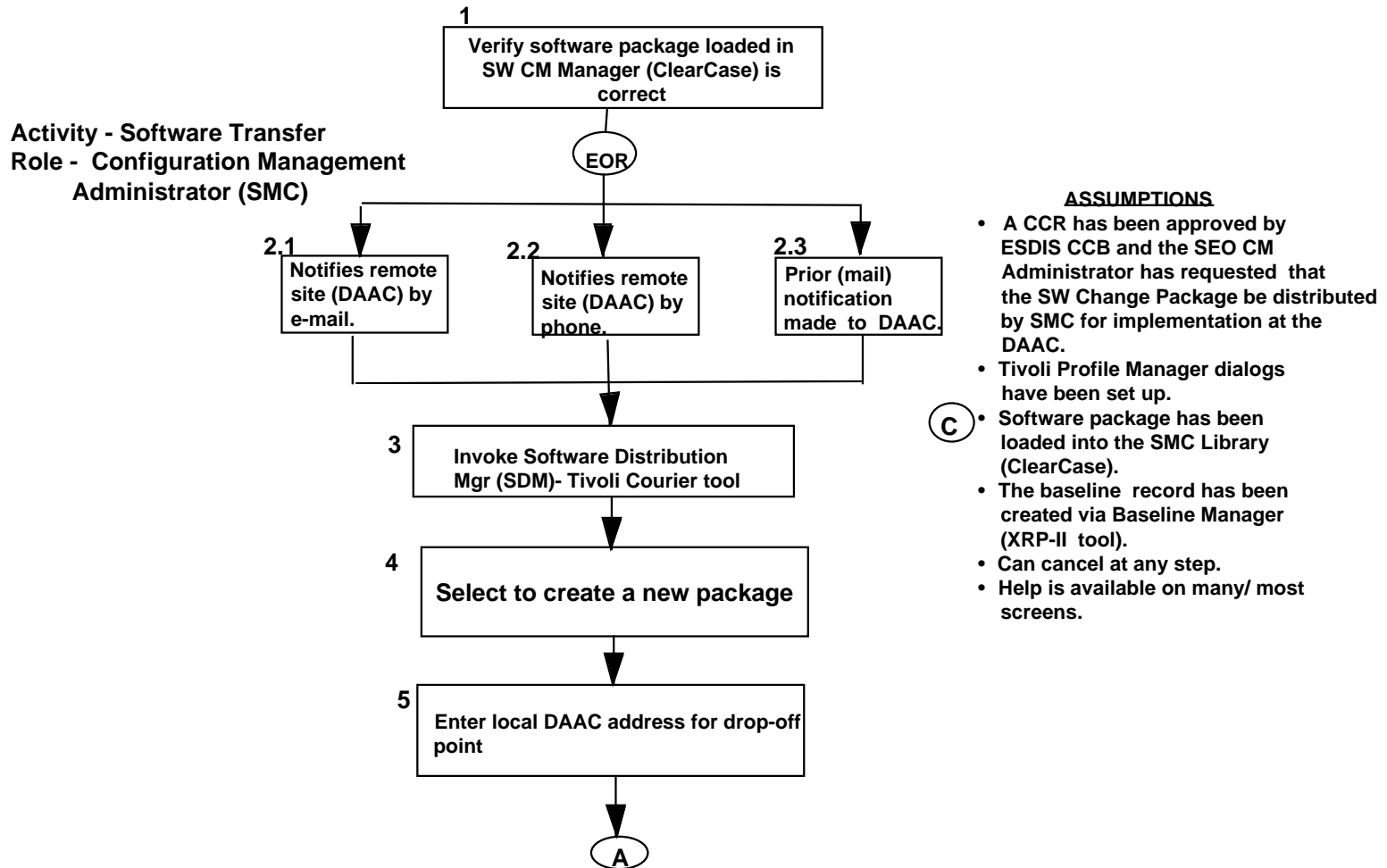


Figure 5.2.3.4-1. Configuration Management Workflow (1 of 6)

Activity - Software Transfer
Role - Configuration Management
Administrator (SMC)

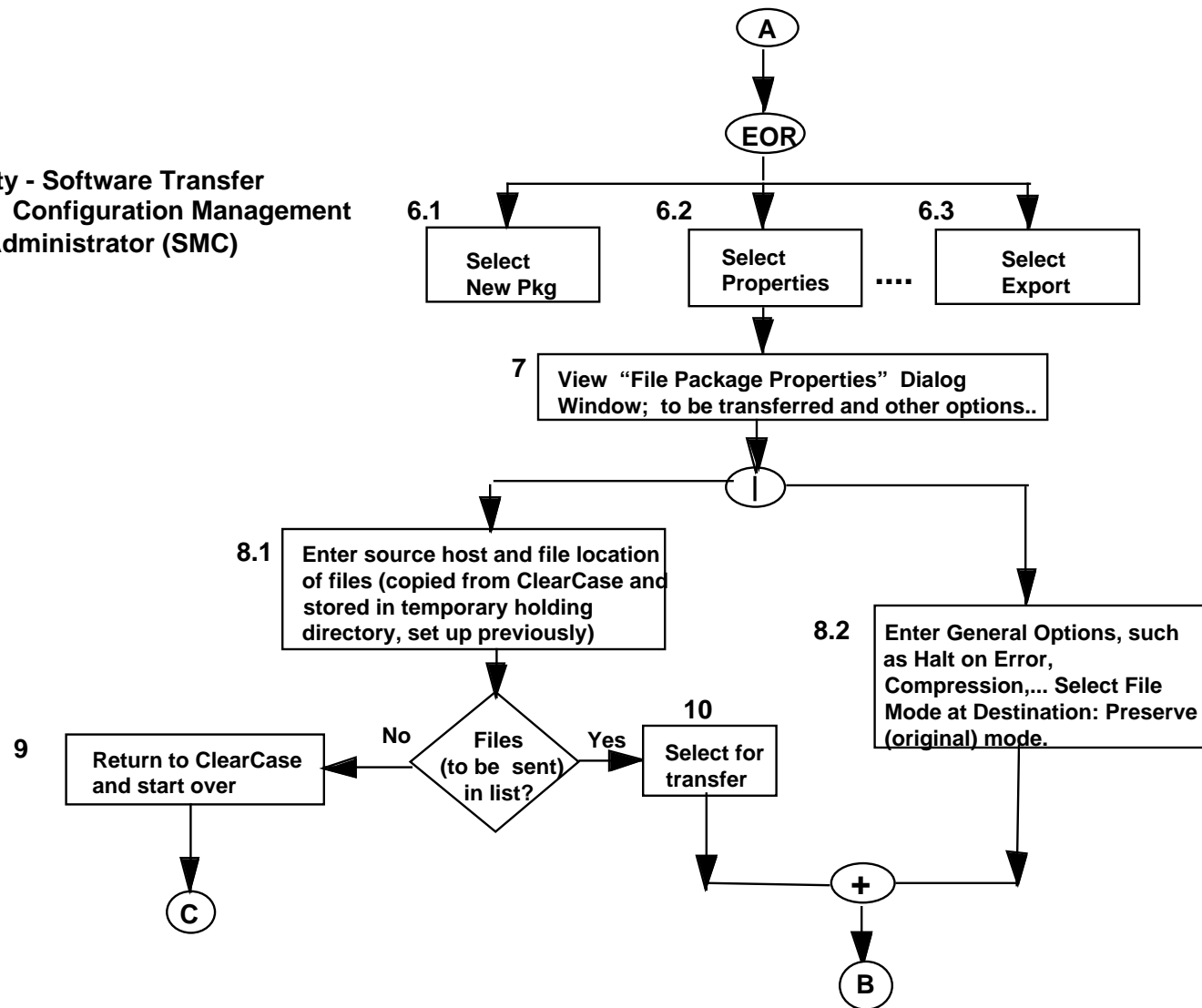


Figure 5.2.3.4-2. Configuration Management Workflow (2 of 6)

Activity - Software Transfer
Role - Configuration Management
Administrator (SMC)

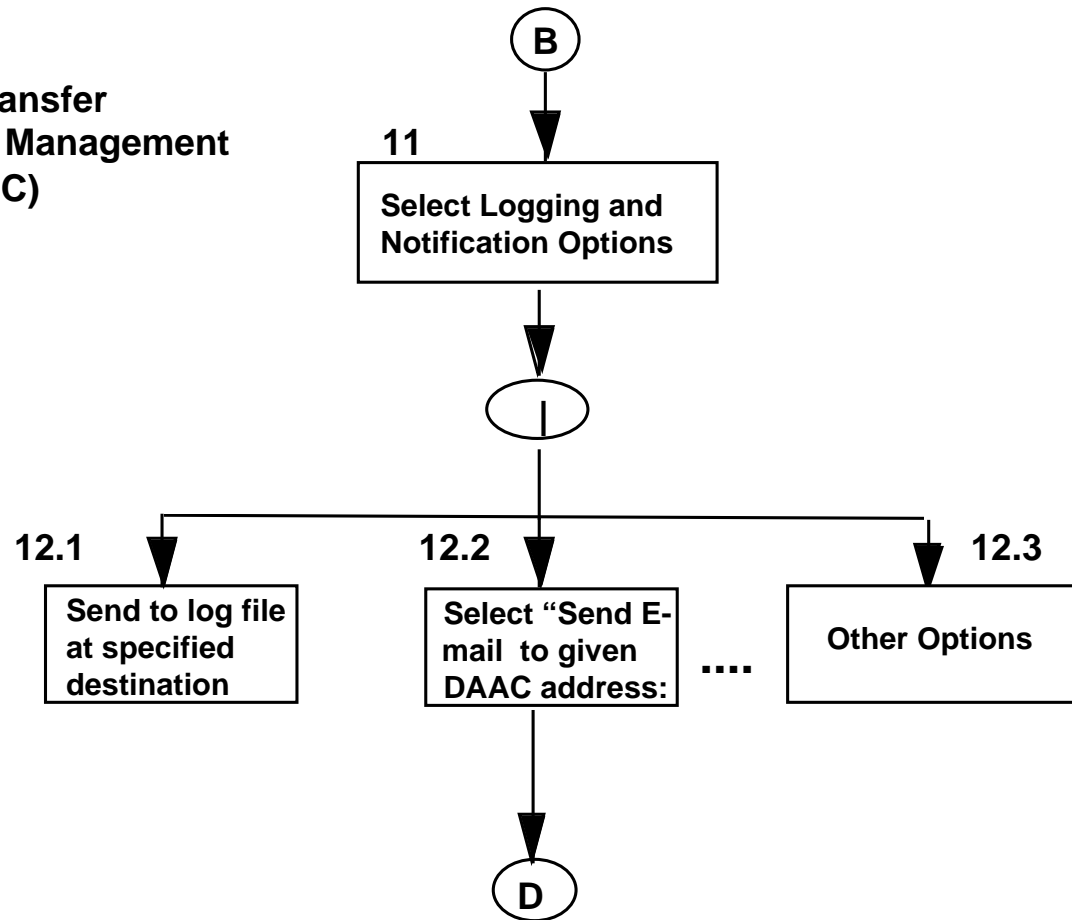


Figure 5.2.3.4-3. Configuration Management Workflow (3 of 6)

Activity - Software Transfer
Role - Configuration Management
Administrator (SMC)

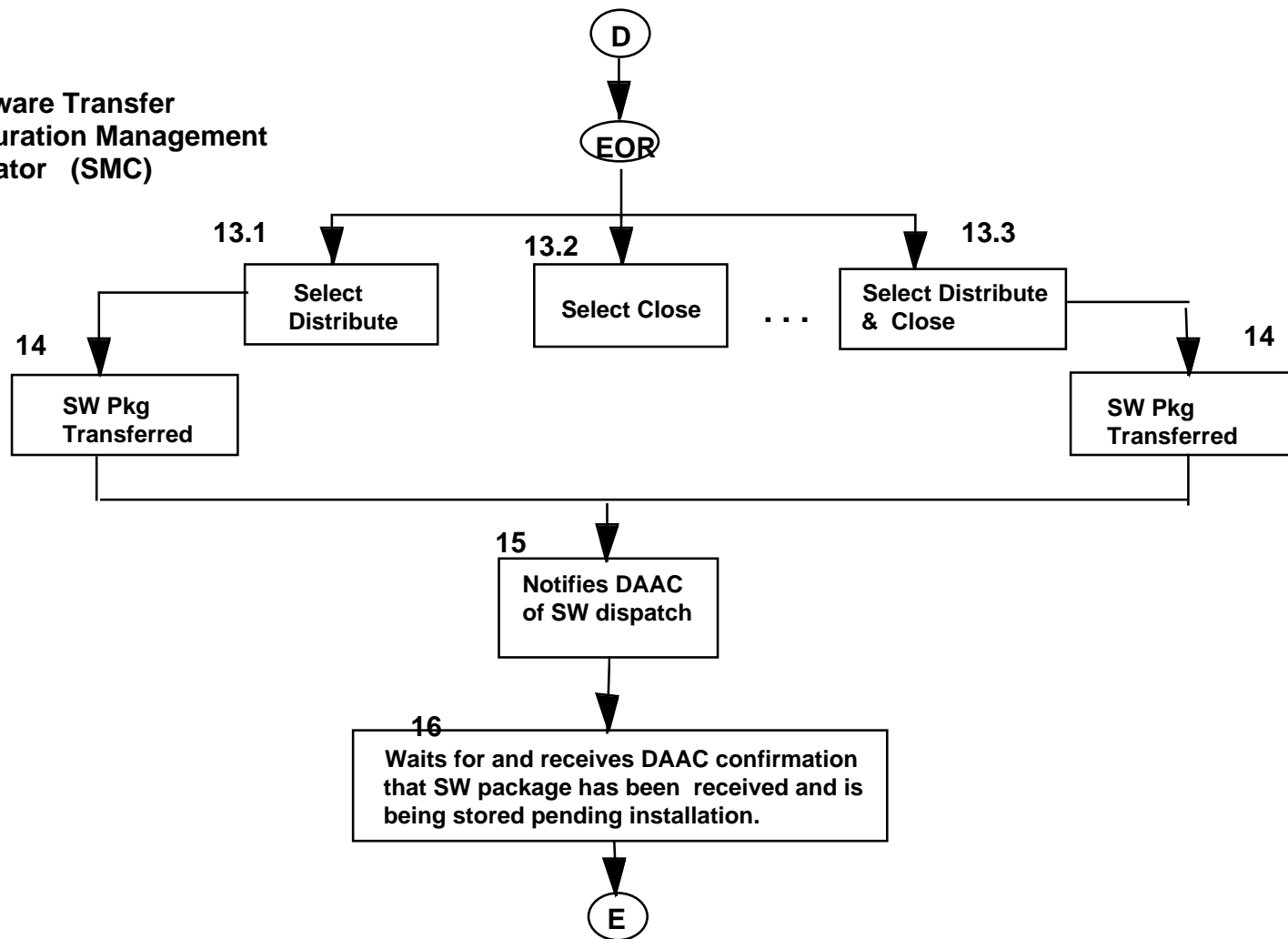


Figure 5.2.3.4-4. Configuration Management Workflow (4 of 6)

Activity - Software Installation
Role -DAAC CM Administrator

and DAAC Sustaining Engineering
SW Maintainer

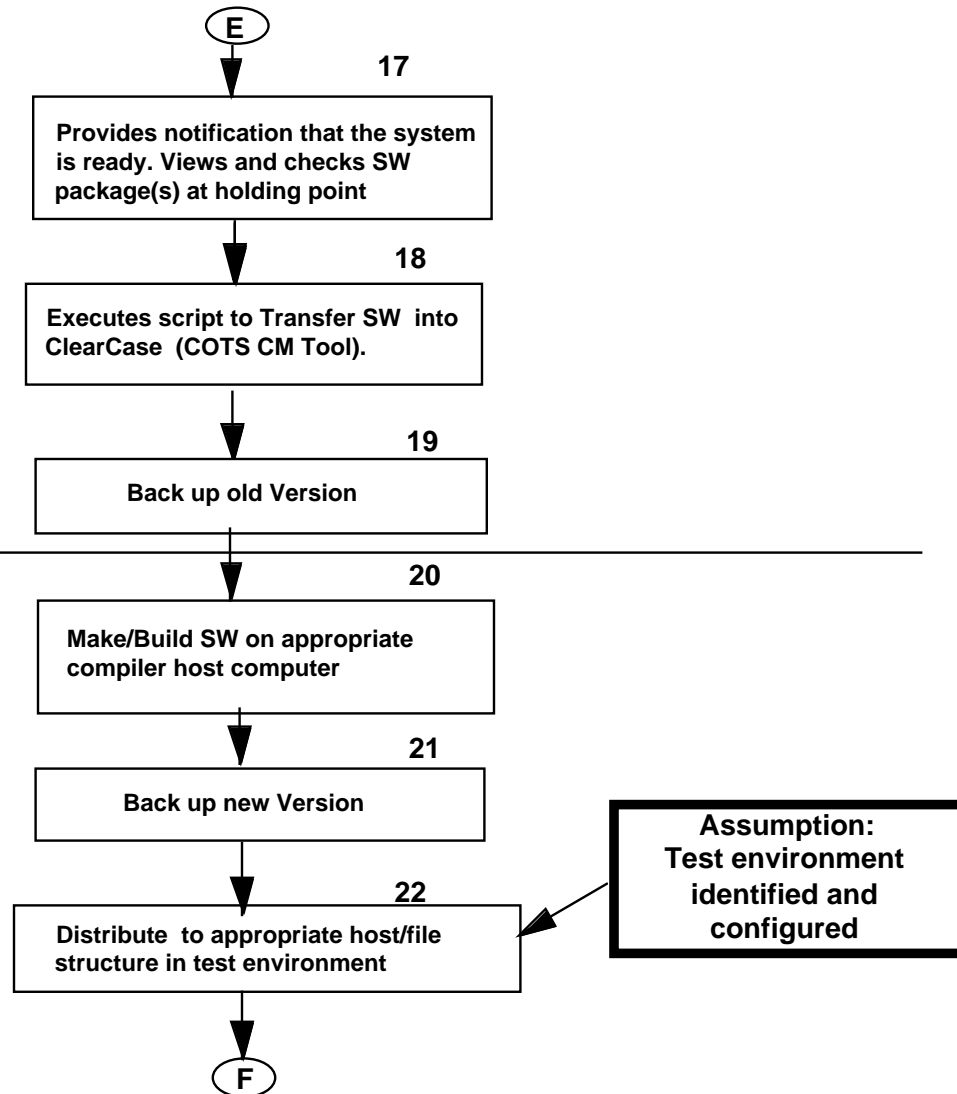


Figure 5.2.3.4-5. Configuration Management Workflow (5 of 6)

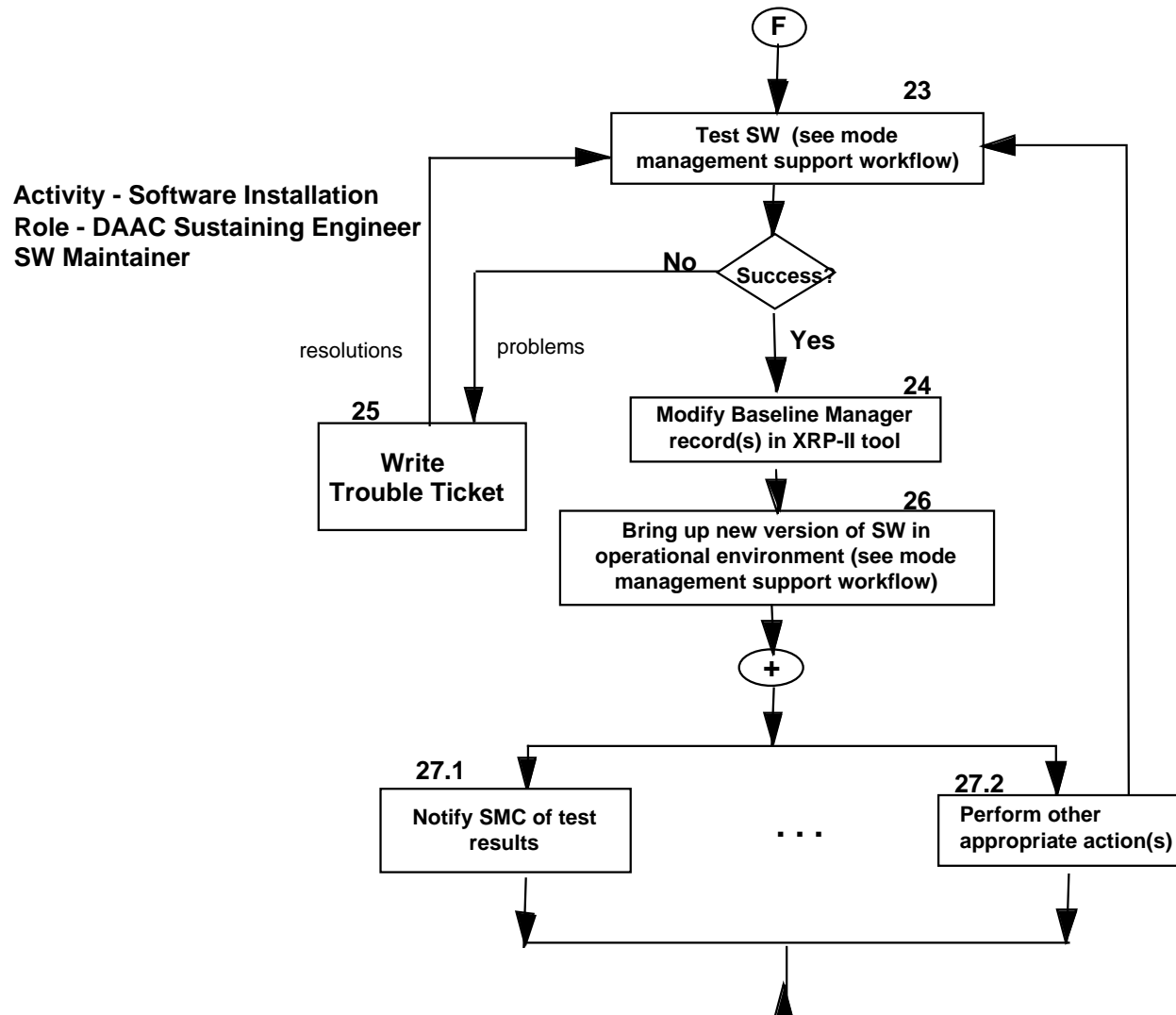


Figure 5.2.3.4-6. Configuration Management Workflow (6 of 6)

Table 5.2.3.4-1. Data Activity for Configuration Management (1 of 2)

Object/ Tool Name	Data Element	Acvity																					
Courier/ ClearCase	SDM-PACKAGE	1	2.1	2.2	2.3	3	4	5	6.1	6.2	6.3	7	8.1	8.2	9	10	11	12.1	12.2	12.3	13.1	13.2	
	Package ID	D				D	I/E									D							
	Package Name	D				D	I/E									D							
	SW Upgrade Name	D				D	I/E									D							
	Version	D				D	I/E									D							
	Description	D				D	I/E									D							
	File Structure	D				D	I/E									D							
	Type	D				D	I/E									D							
	Destination	D				D	I/E	I								D	D	D	D				

Table 5.2.3.4-2. Data Activity for Configuration Management (2 of 2)

Object/ Tool Name	Data Element																
Courier/ ClearCase	SDM-PACKAGE	13.3	14	15	16	17	18	19	20	21	22	23	24	25	26	27.1	27.2
	Package ID					D			D								
	Package Name					D			D								
	SW Upgrade Name					D			D								
	Version					D			D								
	Description					D			D								
	File Structure					D			D								
	Type					D			D								
	Destination					D			D								

5.2.4 Billing & Accounting

Science users order all data products through a DAAC site. In addition, all products are also generated and distributed through a DAAC. The DAAC User Assistant receives the order for a data product from the science user, generates and sends the product to the science user. The DAAC User Assistant enters all processes executed into the ECS system, including products generated and sent to the science user.

The science user is billed for the products shipped to him. All Billing functions for the ECS system are handled at one central location, the SMC. At the SMC, the Billing Clerk logs onto the ECS and accesses the database containing which products have been prepared and sent to a science user. All science user bills and statements are processed, generated, and sent from the SMC.

If a science user receives a bill he believes is in error, he contacts the DAAC User Assistant to question his bill status. The DAAC User Assistant works with the user to investigate their billing inquiry. The DAAC User Assistant investigates the products ordered, sent and billed. The DAAC User Assistant works with the SMC Billing Clerk & Accountant to adjust the user's bill when required.

5.2.4.1 Billing and Accounting Description

Overview

This scenario involves a registered, pre-paid ECS account. The science user receives a bill with charges for a data product which was not received. The scenario begins when funds are deposited in a user's account in advance of placing data product requests. A statement, including a charge for a product that is never received, is generated and sent to the user. The user notifies the DAAC User Assistant that the statement contains charges for a data product that was never received, and requests an adjustment. The DAAC User Assistant investigates the problem with the SMC Billing Clerk and Accountant, and adjusts the bill.

Assumptions

- The account in question is a registered, pre-paid ECS account
- Science User has ordered a data product, but not received it.
- DAAC User Assistant has discretionary authority to adjust bill/statement

Scenario

- Fund a Pre-Paid Account
- Generate a Bill/Statement
- Handle/Research the Bill/Statement Dispute
- User Services representative requests a credit adjustment to the account
- Notify Science User of action taken

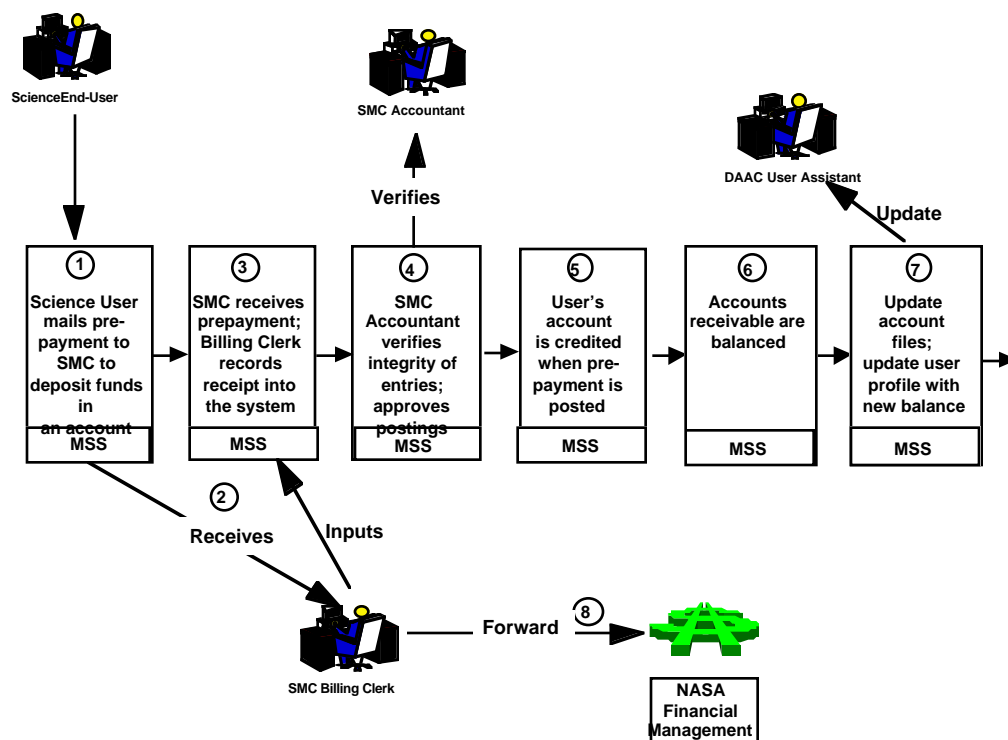


Figure 5.2.4.1-1. Funding a Prepaid Account Functional Flow

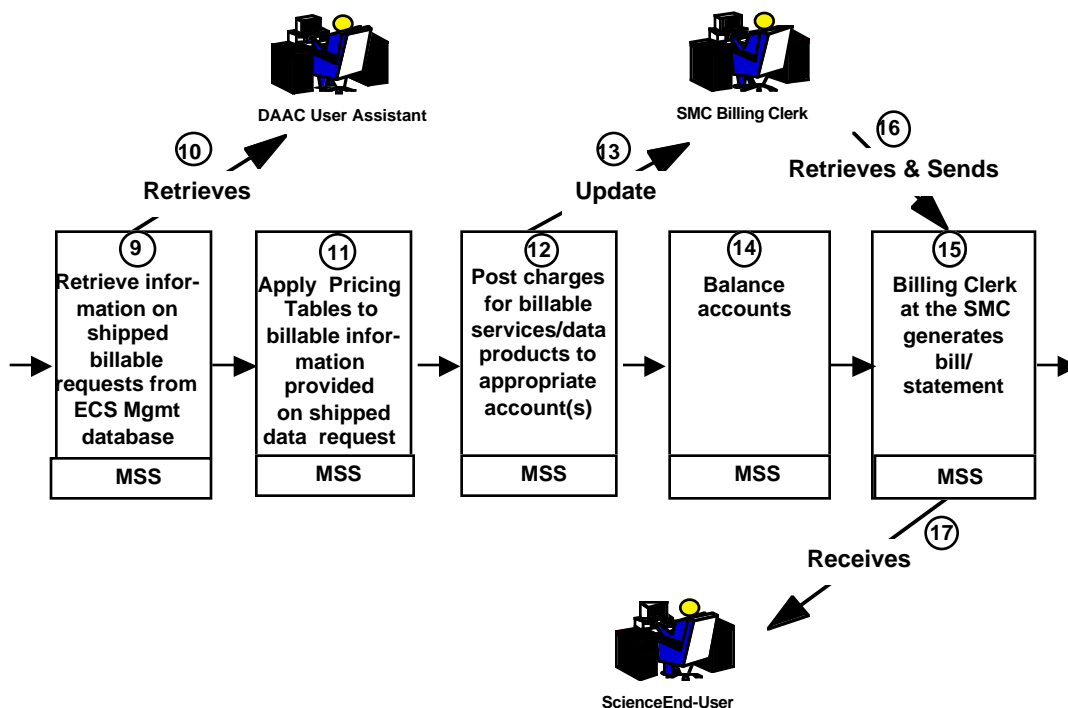


Figure 5.2.4.1-2. Generating a Bill/Statement Functional Flow

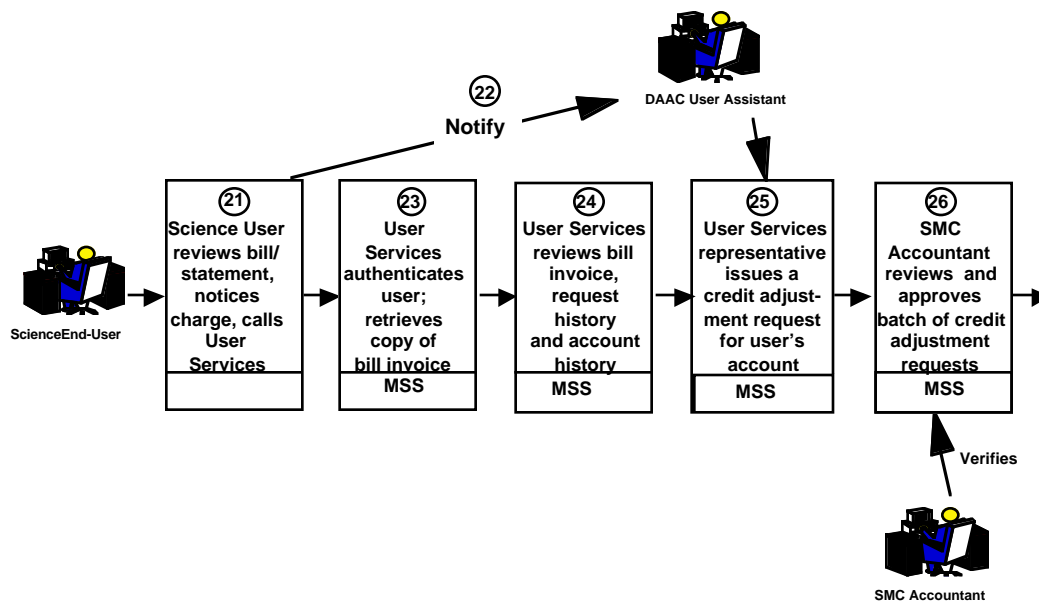


Figure 5.2.4.1-3. Handling a Bill/Statement Dispute Functional Flow (1 of 2)

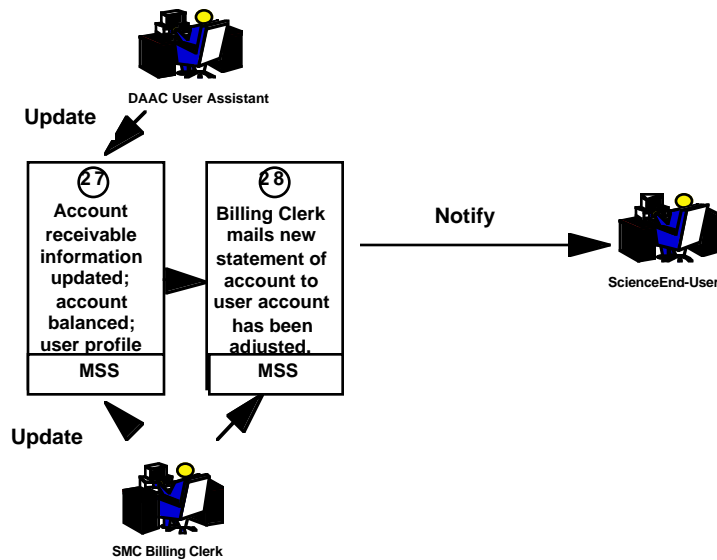


Figure 5.2.4.1-4. Handling a Bill/Statement Dispute Functional Flow (2 of 2)

5.2.4.2 Billing and Accounting Operator Roles

SMC Billing Clerk - Receives and processes all user payments into billing system, depositing funds received in appropriate account(s). Generates, verifies and distributes user statements and bills. Performs on-demand account status verification.

SMC Accountant - Verifies integrity of funds received processing. Reviews, verifies, approves and processes credit adjustments.

DAAC User Assistant - Accesses history report of request and bill/invoice to confirm charges. Reviews account history, identifies incorrect charges and enters credit adjustment request to the account.

5.2.4.3 Detailed Points of View

The following diagrams depict the relevant roles that are needed to accomplish the scenario.

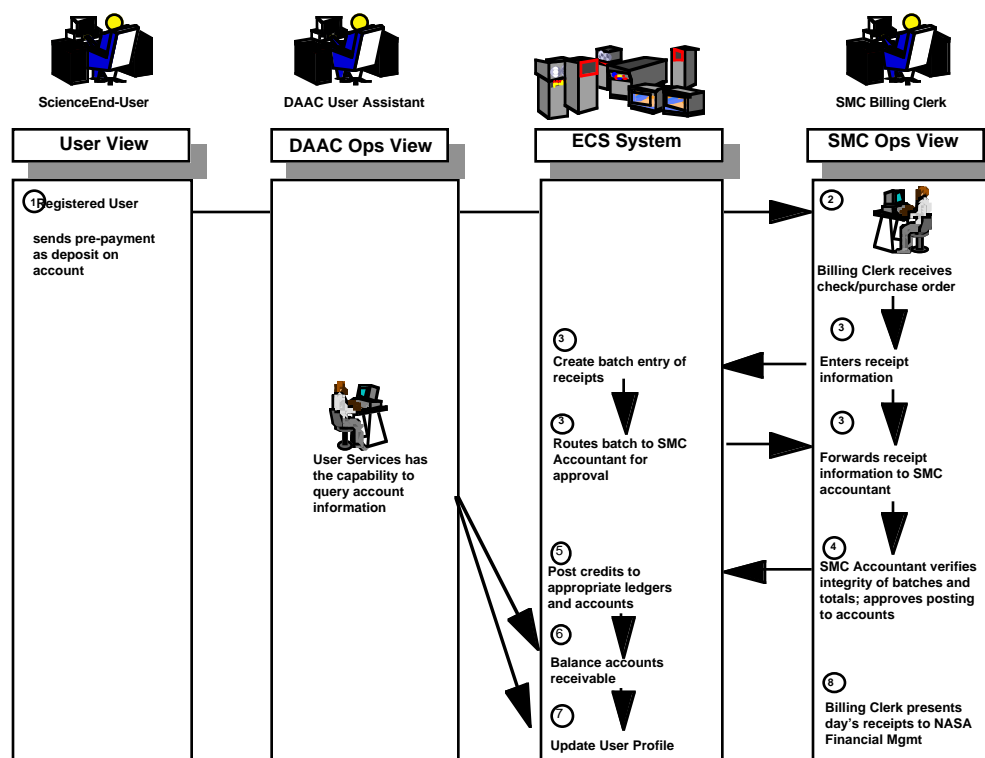


Figure 5.2.4.3-1. Funding an Account Points of View

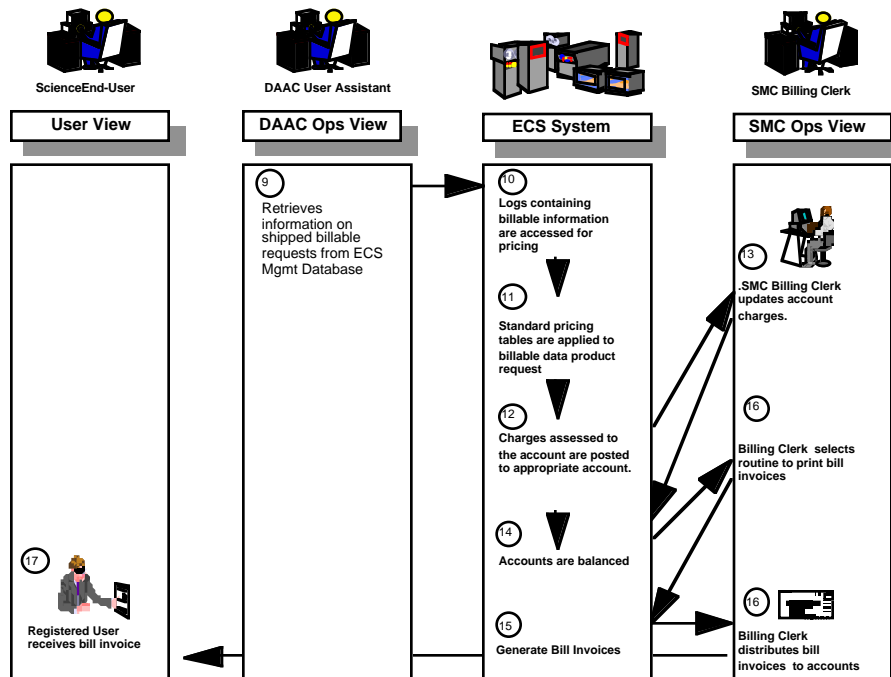


Figure 5.2.4.3-2. Generating a Bill/Statement Points of View

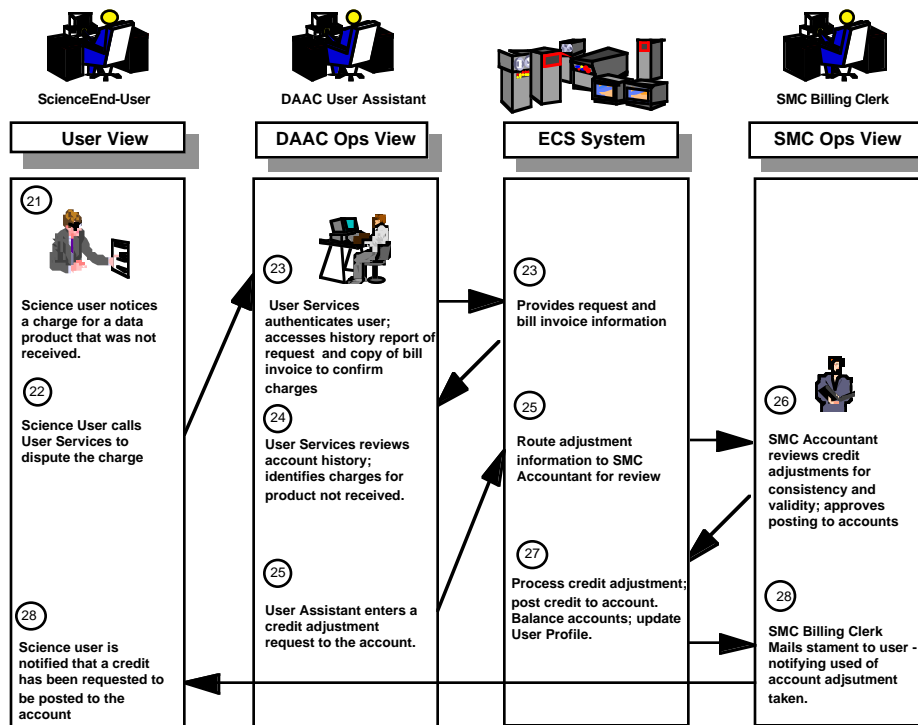


Figure 5.2.4.3-3. Handling a Bill/Statement Dispute Points of View

5.2.4.4 Resolve Bill/Statement Dispute Scenario Workflow

Activity - Resolve Bill/Statement Dispute

Role - DAAC User Assistant

This workflow describes the steps followed by the DAAC User Assistant in order to access a history report of request and bill/invoice to confirm charges, identify incorrect charges and enter a credit adjustment request to the account.

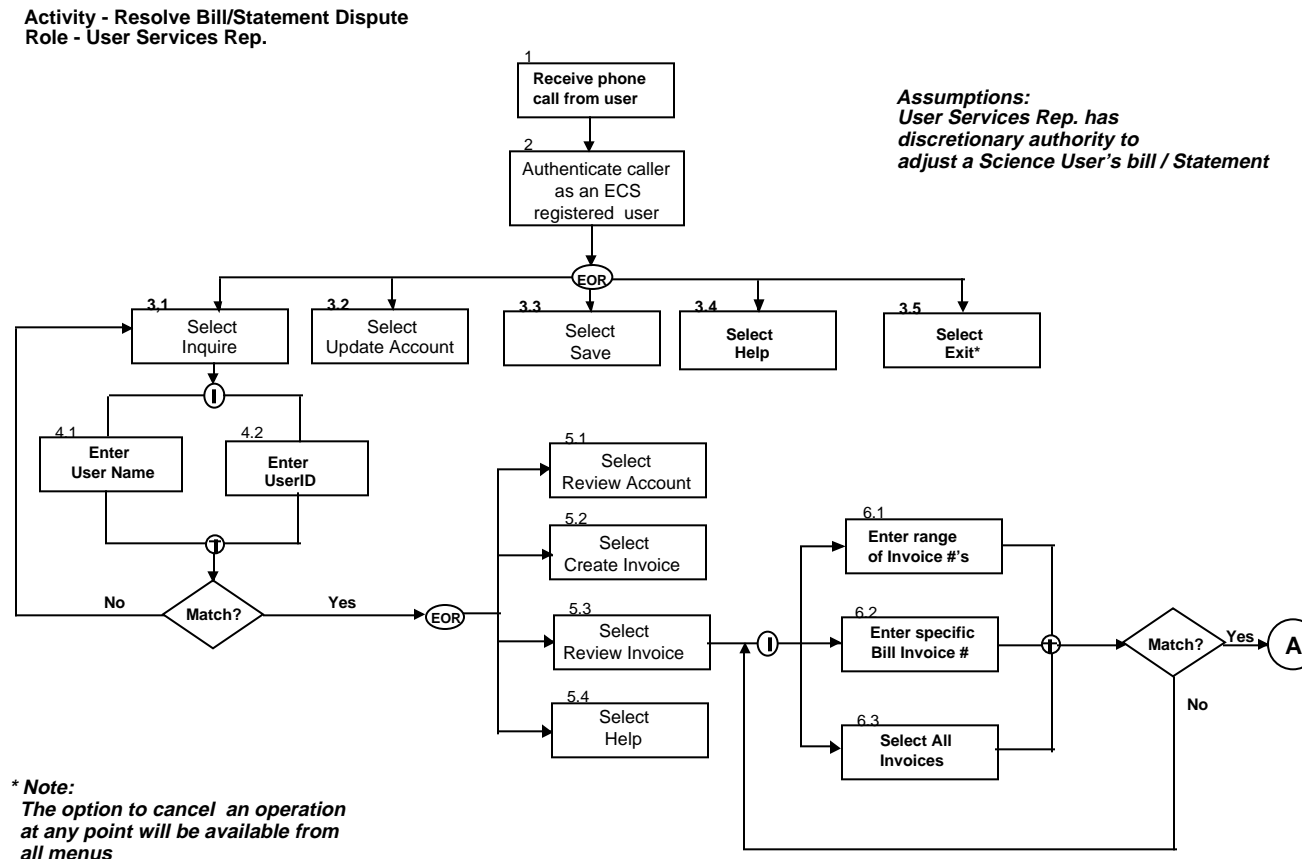


Figure 5.2.4.4-1. User Services Workflow (1 of 3)

Activity - Resolve Bill/Statement Dispute
Role - User Services Rep.

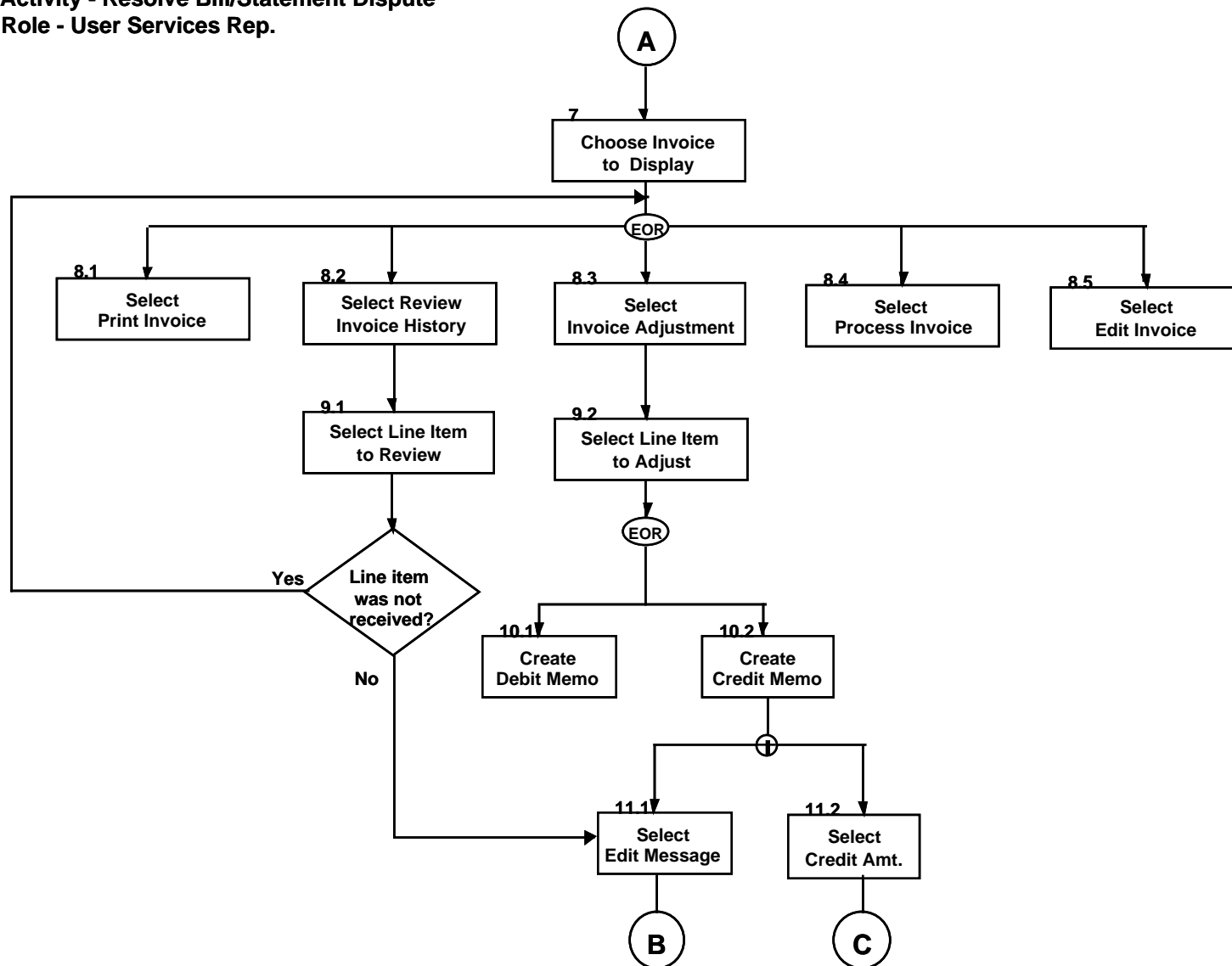


Figure 5.2.4.4-2. User Services Workflow (2 of 3)

Activity - Resolve Bill/Statement Dispute
Role - User Services Rep.

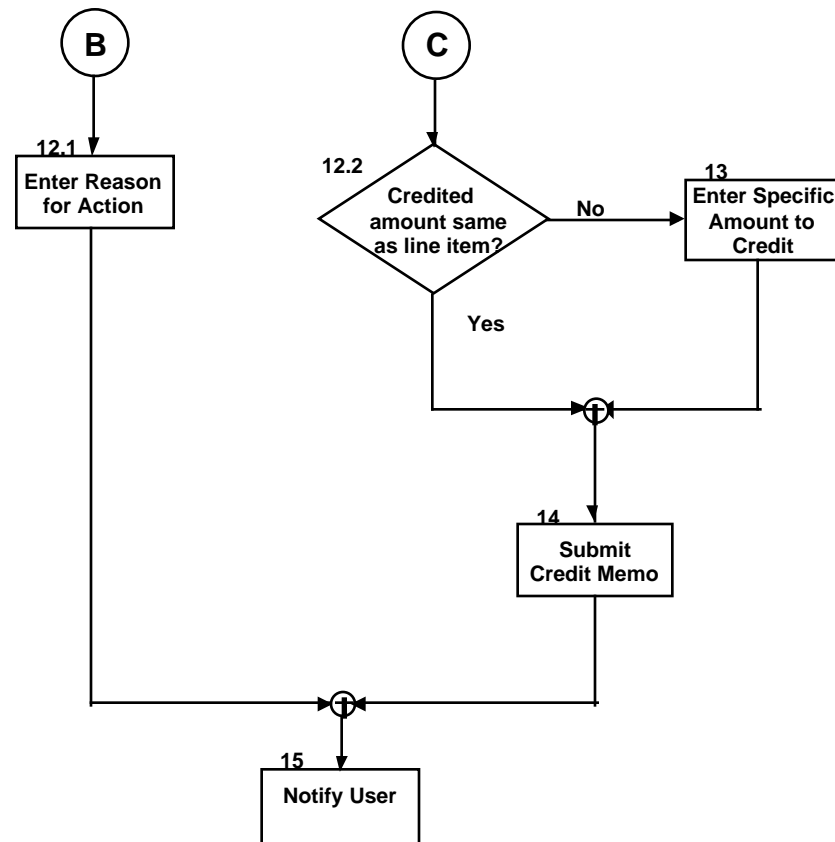


Figure 5.2.4.4-3. User Services Workflow (3 of 3)

Table 5.2.4.4-1. Data Activity for User Services (1 of 4)

Object Name	Data Element	Activity								
		1	2	3.1	3.2	3.3	3.4	3.5	4.1	4.2
msBa - BAAS - COTS	User ID									
msBa - BAAS - COTS	Bill/Statement Number									
msBa - BAAS - COTS	Bill/Statement									
msBa - BAAS - COTS	Request ID									
msBa - BAAS - COTS	Request Items List									
msBa - BAAS - COTS	Credit Memo									
msBa - BAAS - COTS	Annotation Message									

Table 5.2.4.4-2. Data Activity for User Services (2 of 4)

Object Name	Data Element	Activity								
		5.1	5.2	5.3	5.4	6.1	6.2	6.3	7	8.1
msBa - BAAS - COTS	User ID			D						
msBa - BAAS - COTS	Bill/Statement Number					I	I	I	I	
msBa - BAAS - COTS	Bill/Statement								D	
msBa - BAAS - COTS	Request ID									
msBa - BAAS - COTS	Request Items List									
msBa - BAAS - COTS	Credit Memo									
msBa - BAAS - COTS	Annotation Message									

Table 5.2.4.4-3. Data Activity for User Services (3 of 4)

[illegible]

Table 5.2.4.4-4. Data Activity for User Services (4 of 4)

[illegible]

5.2.4.5 SMC Accountant Scenario Workflow

Activity - Resolve Bill/Statement Dispute

Role - SMC Accountant

This workflow describes the steps followed by the SMC Accountant in order to verify the integrity of funds received processing. The SMC Accountant reviews, verifies, approves and processes credit adjustments.

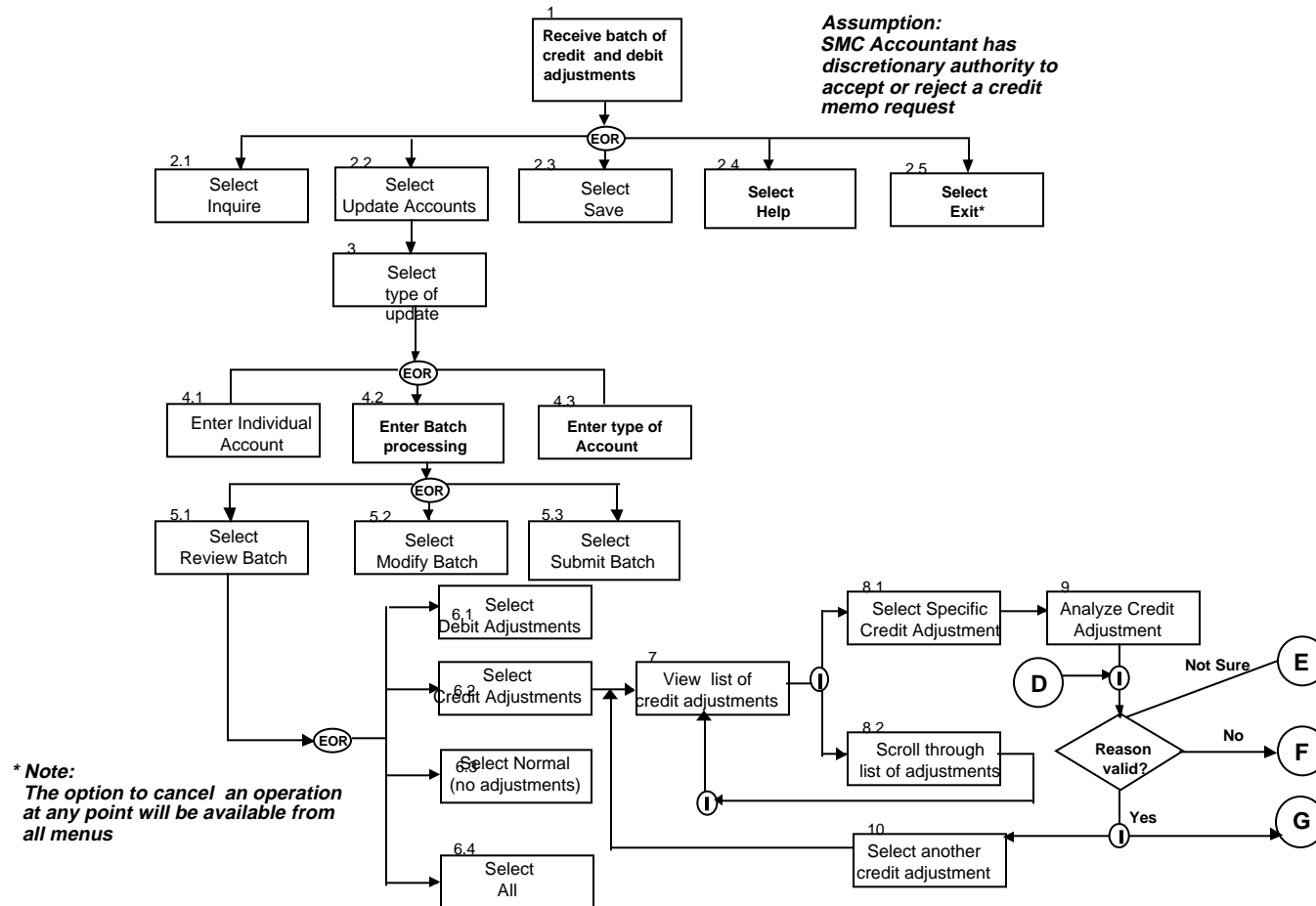


Figure 5.2.4.5-1. SMC Accountant Workflow (1 of 2)

Activity - Resolve Bill/Statement Dispute
Role - SMC Accountant

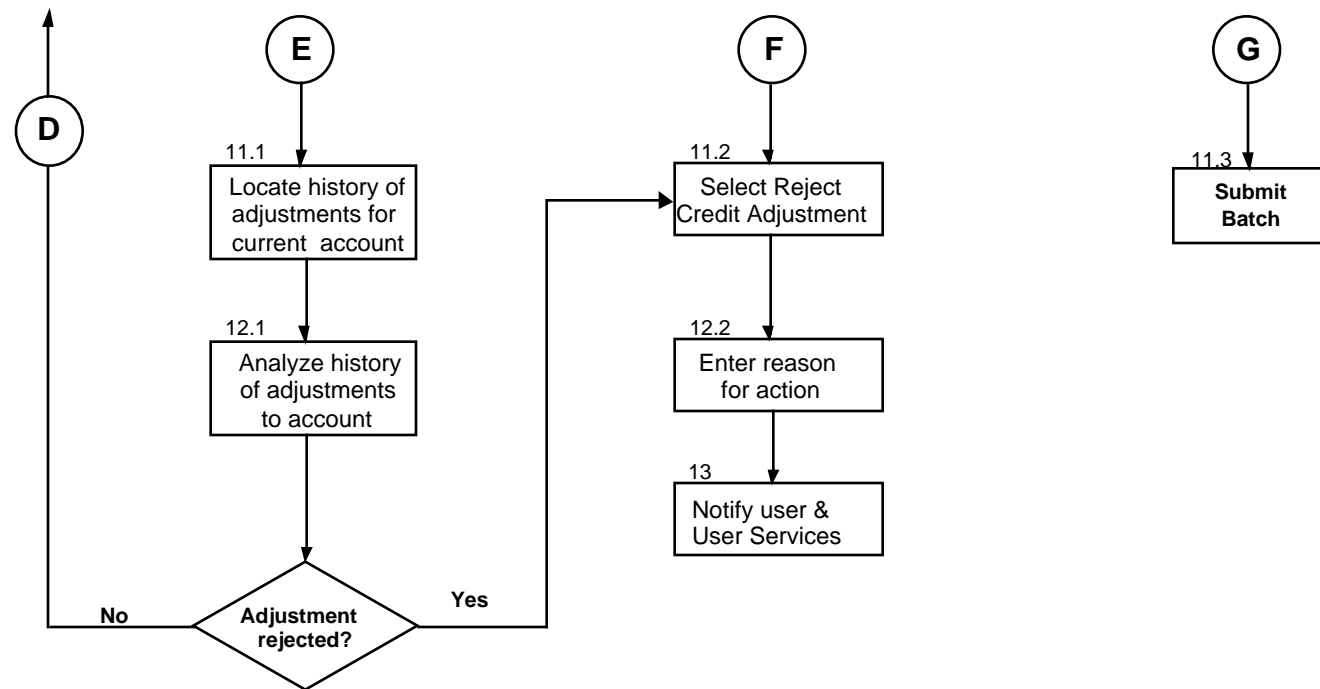


Figure 5.2.4.5-2. SMC Accountant Workflow (2 of 2)

Table 5.2.4.5-1. Data Activity for SMC Accountant (1 of 3)

Object Name	Data Element	Activity								
		1	2.1	2.3	2.4	2.5	3	4.1	4.2	4.3
msBa - BAAS - COTS	User ID									
msBa - BAAS - COTS	Bill/Statement Number									
msBa - BAAS - COTS	Bill/Statement									
msBa - BAAS - COTS	Request ID									
msBa - BAAS - COTS	Request Items List									
msBa - BAAS - COTS	Credit Memo									
msBa - BAAS - COTS	Annotation Message									

Table 5.2.4.5-2. Data Activity for SMC Accountant (2 of 3)

[illegible]

Table 5.2.4.5-3. Data Activity for SMC Accountant (3 of 3)

Object Name	Data Element	Activity								
		8.2	9	10	11.1	11.2	11.3	12.1	12.2	13
msBa - BAAS - COTS	User ID	D								
msBa - BAAS - COTS	Bill/Statement Number	D								
msBa - BAAS - COTS	Bill/Statement									
msBa - BAAS - COTS	Request ID									
msBa - BAAS - COTS	Request Items List									
msBa - BAAS - COTS	Credit Memo	D	D		D	E	I	D	E	I
msBa - BAAS - COTS	Annotation Message		D		D	E		D	E	

5.2.5 Mode Management

Mode management allows operations staff to perform testing and/or training activities while production activities continue uninterrupted. It addresses the planning, initiation, execution, monitoring, and control of various system activities. Each unique activity that requires process and data separation is classified as a mode. Mode management enables the execution of multiple modes, such that each mode functions without interfering with the other modes and each mode maintains data integrity throughout its execution such as, testing a data server application within the same system that is supporting production activities. The test copy of the data server must not interfere/interact with the production copy of the data server on both the data and process levels. In addition, it will only see and have access to interface components that have been specifically set up and initiated under the same test mode. Production processes can never read from test/training data sets and test/training data can never be written to production data sets.

The site Resource Manager will have a view of all the components supporting each mode. This view is provided through HP OpenView and can be configured to display mode specific application and process-level components through the use of maps and sessions. Software components will be duplicated, and hardware resources will be isolated whenever necessary, to support an additional mode. However, there will be shared resources, both hardware and software, that require special consideration to enable mode management support.

5.2.5.1 Scenario Description

This scenario discusses testing a Data Server modification within the production environment and how mode management supports this activity. The test plan is evaluated and a mode identifier is assigned. A resource plan is then generated and the system is configured. The test is initiated, monitored, and controlled. Following completion the system is returned to a desired state.

Assumptions

Data server Modification has been initially tested within the development environment.

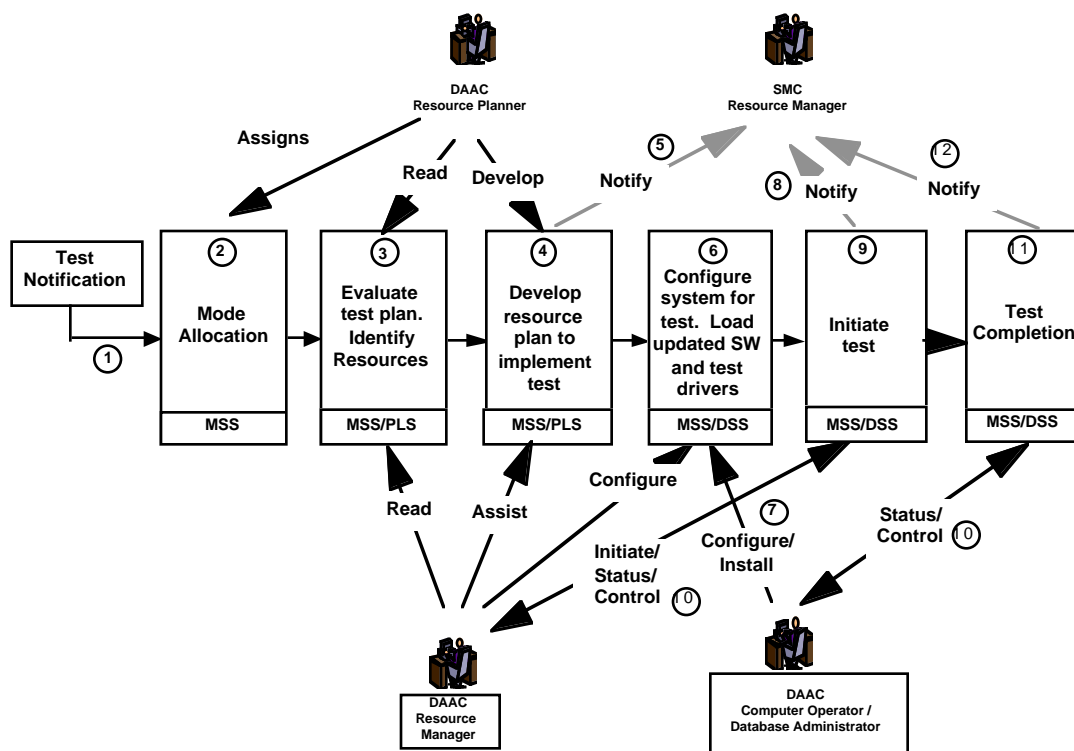


Figure 5.2.5.1-1. Mode Management Functional Flow

5.2.5.2 Operator Roles

DAAC Resource Manager Responsible for resource and system configuration to support mode management. Serves as coordinator for mode establishment. Initiates mode management service and monitors system state during test execution. Provides test status DAAC staff and SMC Resource Manager on an ongoing basis.

DAAC Resource Planner Evaluates plan, identifies, and schedules resources required to support the test. Develops resource plan in consultation with the Resource Manager.

Computer Operator Creates directory structure to support testing. Copies/installs test data and software into the test directories. Monitors test software during execution and reconfigures system after test completion.

Database Administrator Sets up database partitions to support test.

5.2.5.3 Detailed Points of View

The following provides an overview of Mode Management and identifies activities taking place in the ECS subsystems as well as activities and interactions by the DAAC and SMC staff.

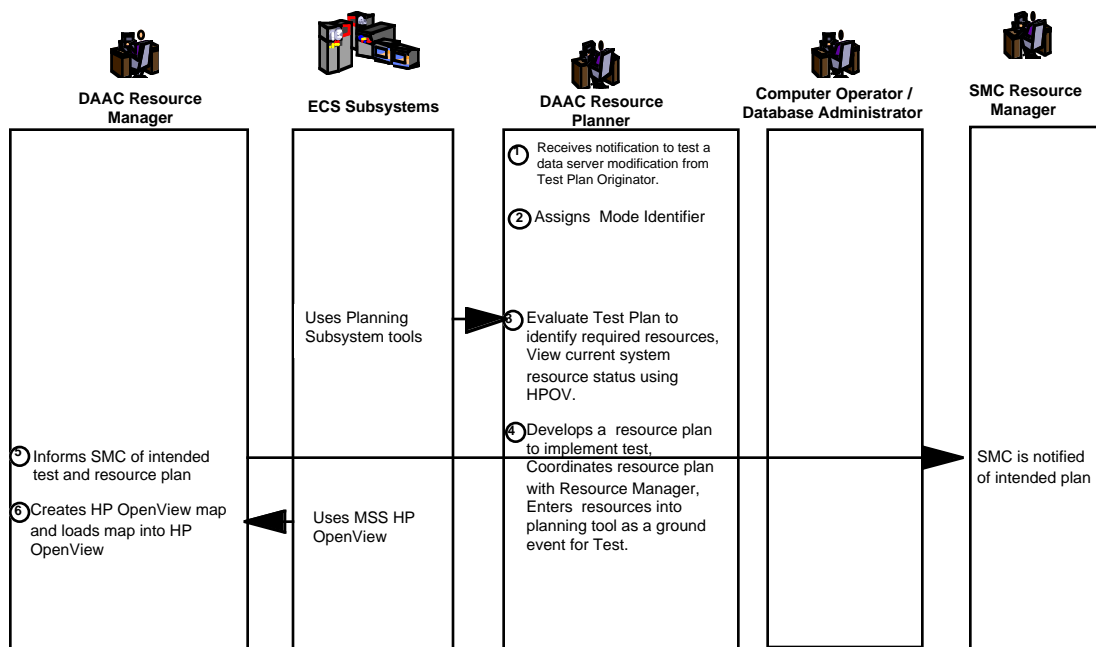


Figure 5.2.5.3-1. Mode Management Points of View (1 of 4)

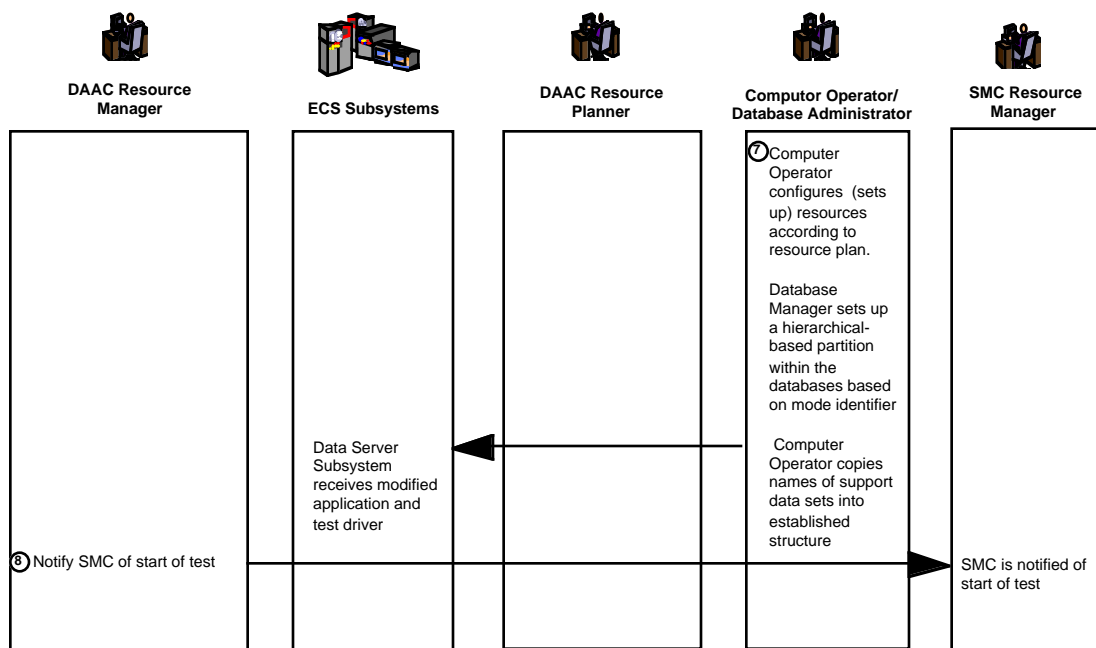


Figure 5.2.5.3-2. Mode Management Points of View (2 of 4)

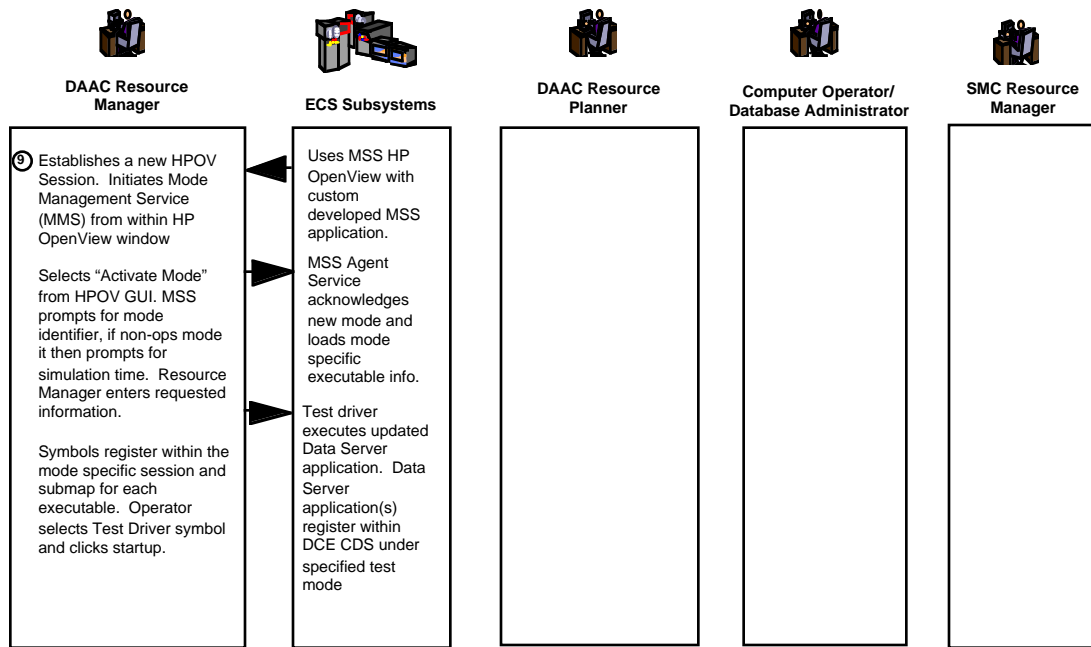


Figure 5.2.5.3-3. Mode Management Points of View (3 of 4)

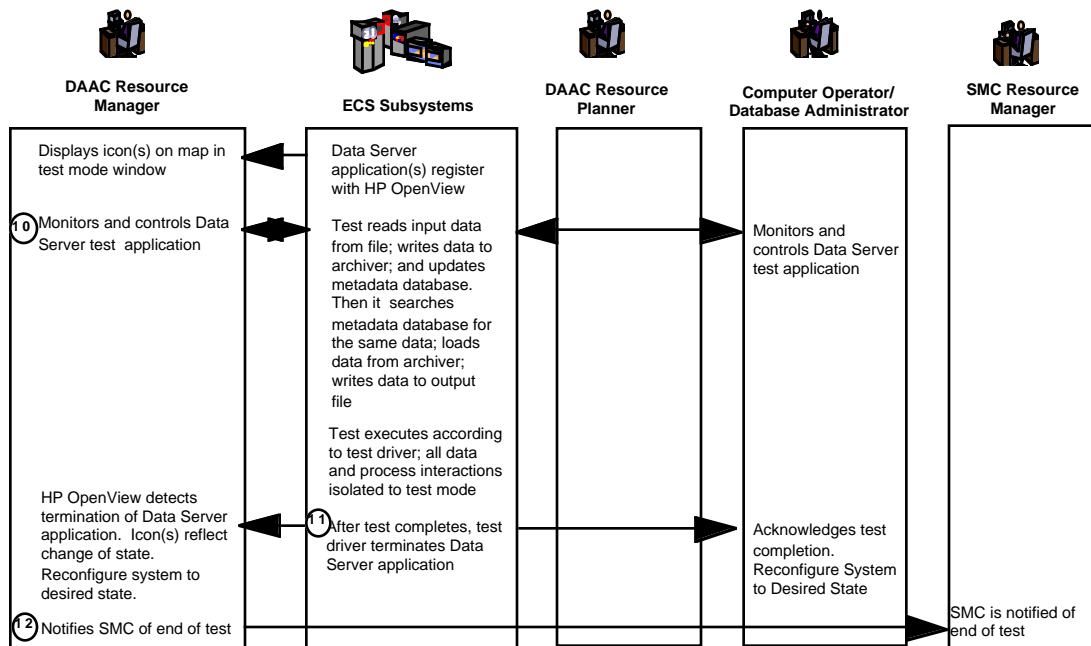


Figure 5.2.5.3-4. Mode Management Points of View (4 of 4)

This section is continued on the next page.

5.2.5.4 Mode Management Support Workflow I

Role: Resource Manager

A test plan is evaluated and the Resource Manager assists in the development of a resource plan. The Resource Manager works with the System and Database Administrators to configure the test environment. The test is executed and monitored.

Workflow

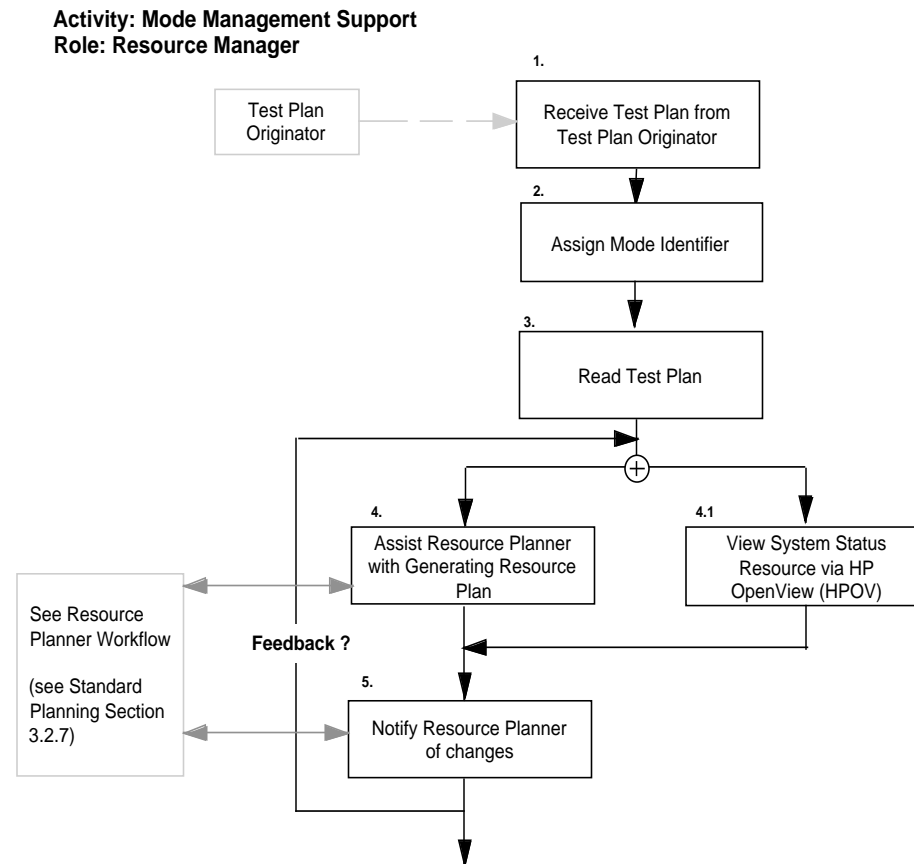


Figure 5.2.5.4-1. Resource Manager Workflow (1 of 4)

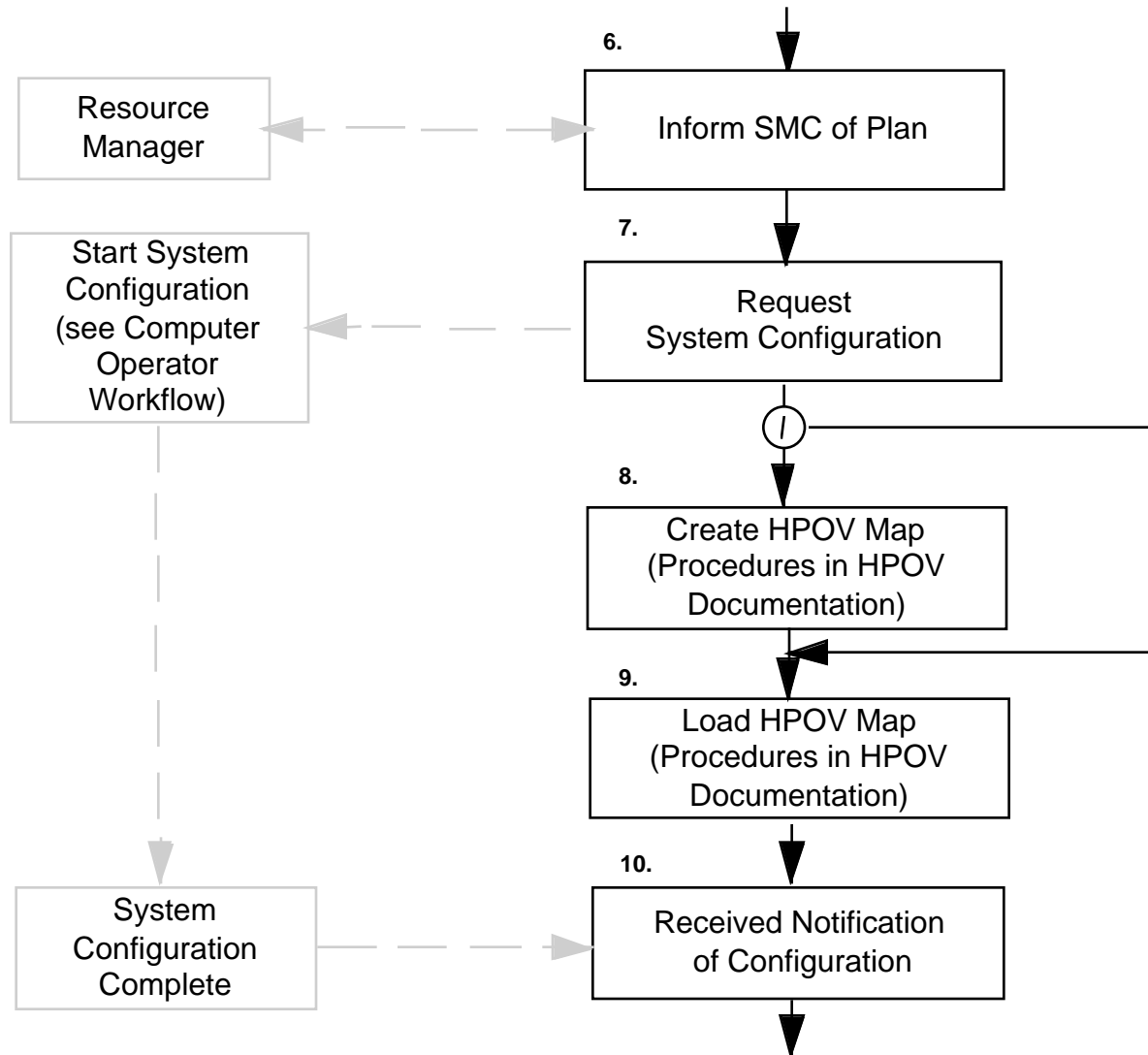


Figure 5.2.5.4-2. Resource Manager Workflow (2 of 4)

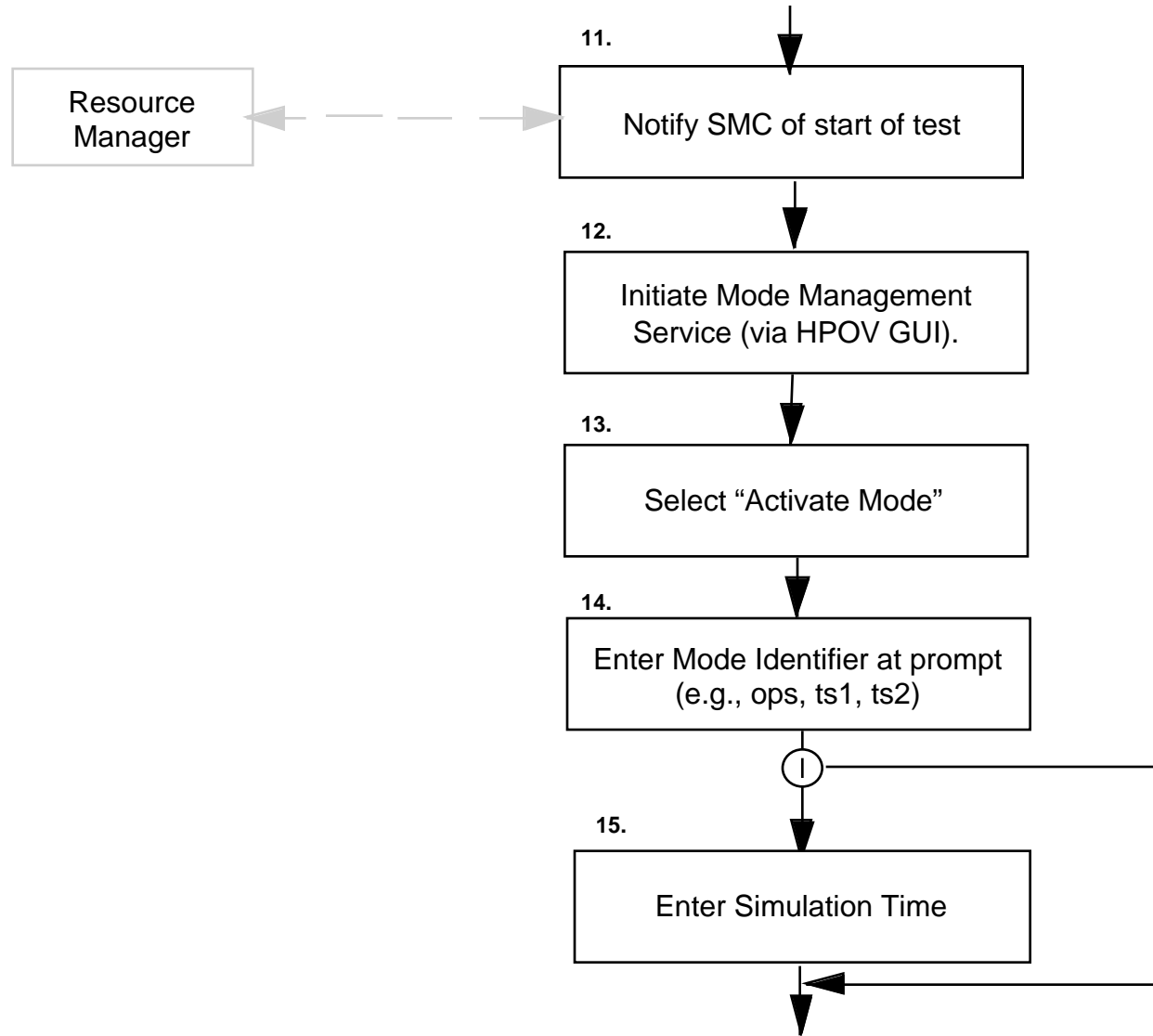


Figure 5.2.5.4-3. Resource Manager Workflow (3 of 4)

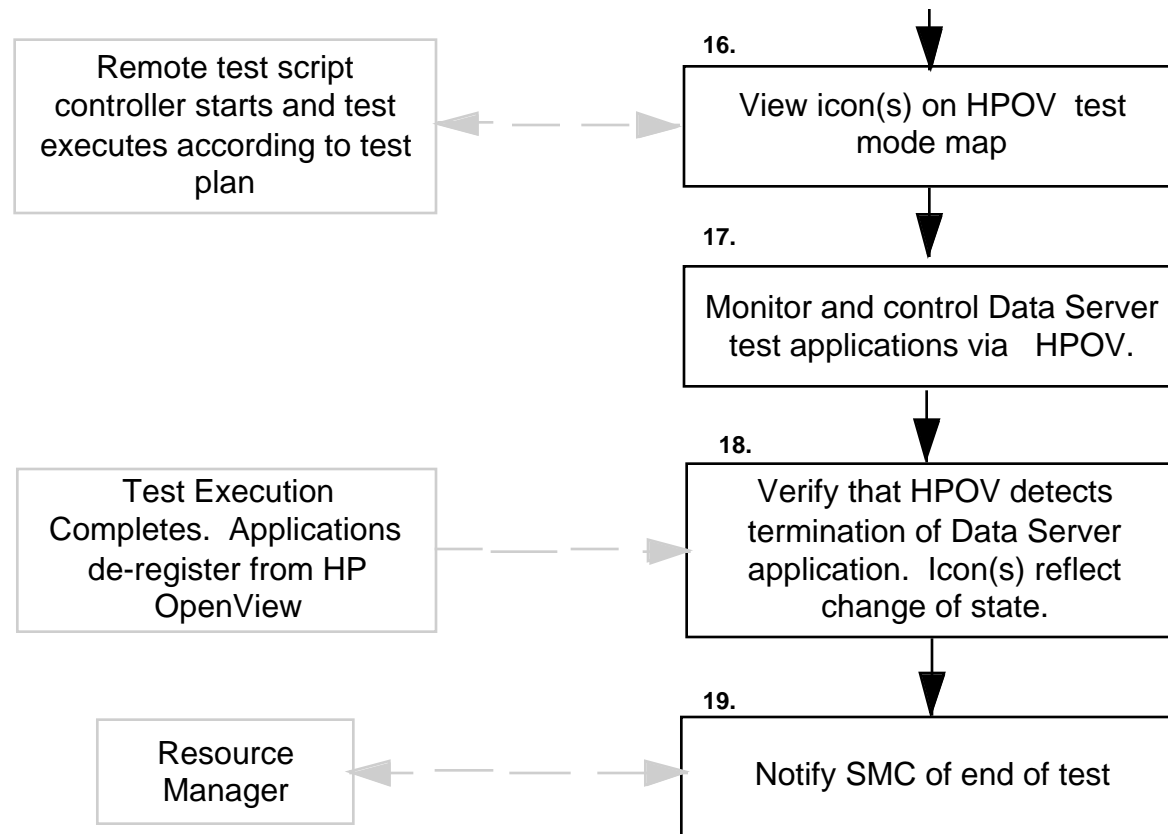


Figure 5.2.5.4-4. Resource Manager Workflow (4 of 4)

Data Activity Table

Table 5.2.5.4-1. Data Activity for Resource Manager

Object Name	Data Element	Activity																			
		1	2	3	4.1	4.2	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
MsMmMode	_mode															I					
MsMmModelnit	_simtime																I				
MsMmSuspend	_seconds																				
MsMmShutdow n	_seconds																				

5.2.5.5 Mode Management Support Workflow II

Role: Resource Planner

The Resource Planner identifies resources required to run test and creates a Resource Plan.

Workflow

Activity: Mode Management Support
Role: Resource Planner

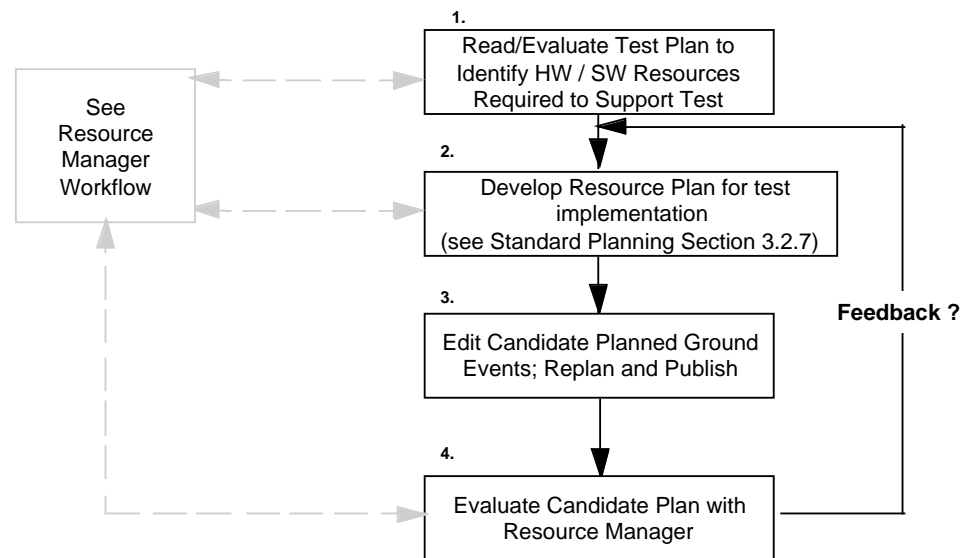


Figure 5.2.5.5-1. Resource Planner Workflow

Data Activity Table

Table 5.2.5.5-1. Data Activity for Resource Planner

The Resource Planner's function within Mode Management Support is strictly Procedural.

5.2.5.6 Mode Management Support Workflow III

Role: Computer Operator / Database Administrator

Creates test environment by creating directory structure and installing test data and software. Database Administrator sets up database partitions based on mode identifier.

Workflow

Activity: Mode Management Support
Role: Computer Operator

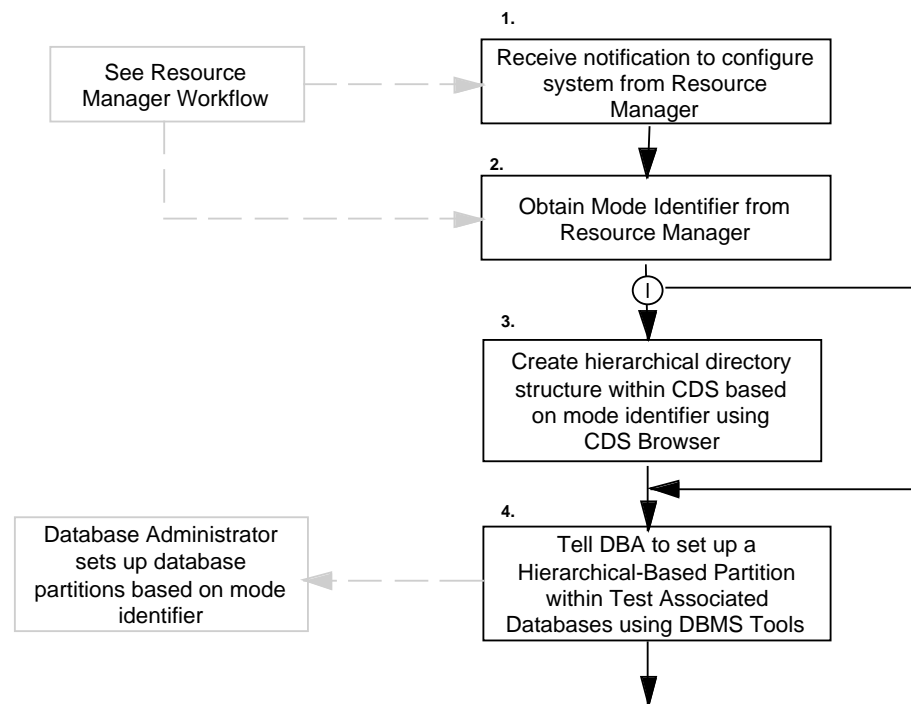


Figure 5.2.5.6-1. Computer Op. Workflow (1 of 3)

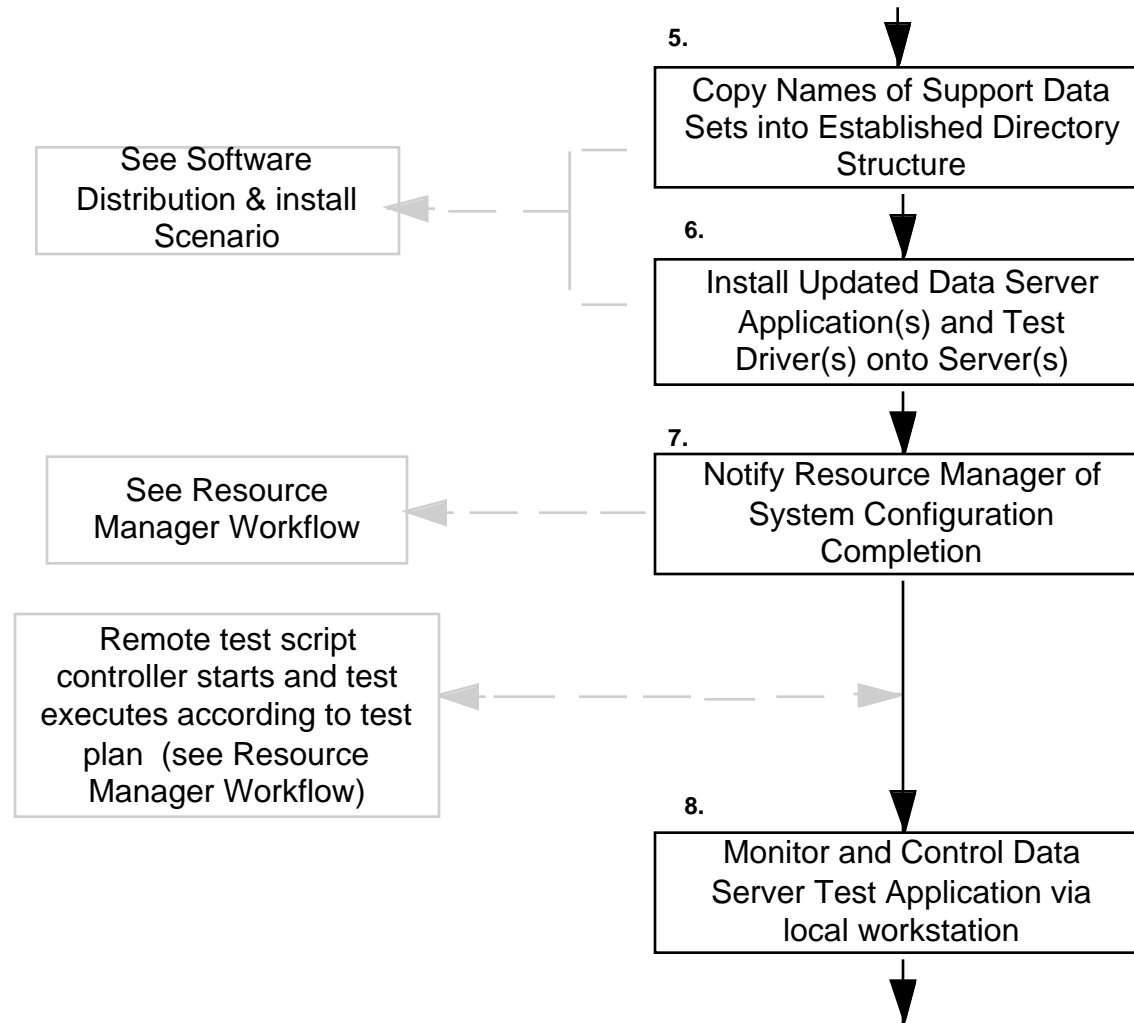


Figure 5.2.5.6-2. Computer Op. Workflow (2 of 3)

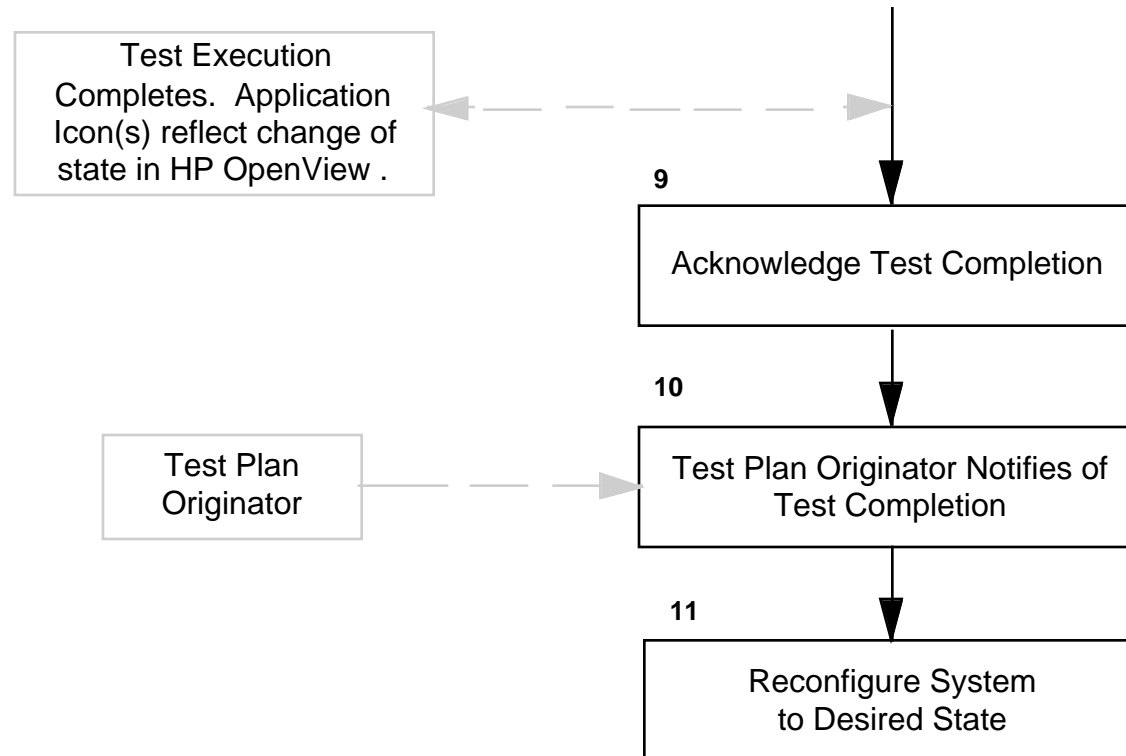


Figure 5.2.5.6-3. Computer Op. Workflow (3 of 3)

Data Activity

Table 5.2.5.6-1. Data Activity for Computer Op.

The Computer Operator's/DataBase Administrator's function within Mode Management Support is strictly Procedural.

5.2.6 Trouble Ticketing

This scenario describes the life of a trouble ticket. The Trouble Ticket (TT) process includes entering, evaluating, resolving and closing the problem. Interactions between the end-user, Operations Supervisor, Maintenance Coordinator and the Trouble Ticket Review Board are described and defined in this scenario.

5.2.6.1 Description

The scenario begins when a registered ECS Science End-User (the originator) has discovered a significant problem and submits a Trouble Ticket. The Operations Supervisor believing the problem to be a COTS problem, assigns the TT to the Maintenance Coordinator (i.e. responsible organization lead) for review and analysis of the problem. After the Maintenance Coordinator completes an analysis of the problem, a recommended solution is submitted to the TT Review Board. The TT Review Board and Chair approves the solution and directs the Maintenance Coordinator to implement the proper corrective action. Upon completion of the repair, the Maintenance Coordinator documents the corrective action and informs the TT Review Board for final approval and closure of the TT.

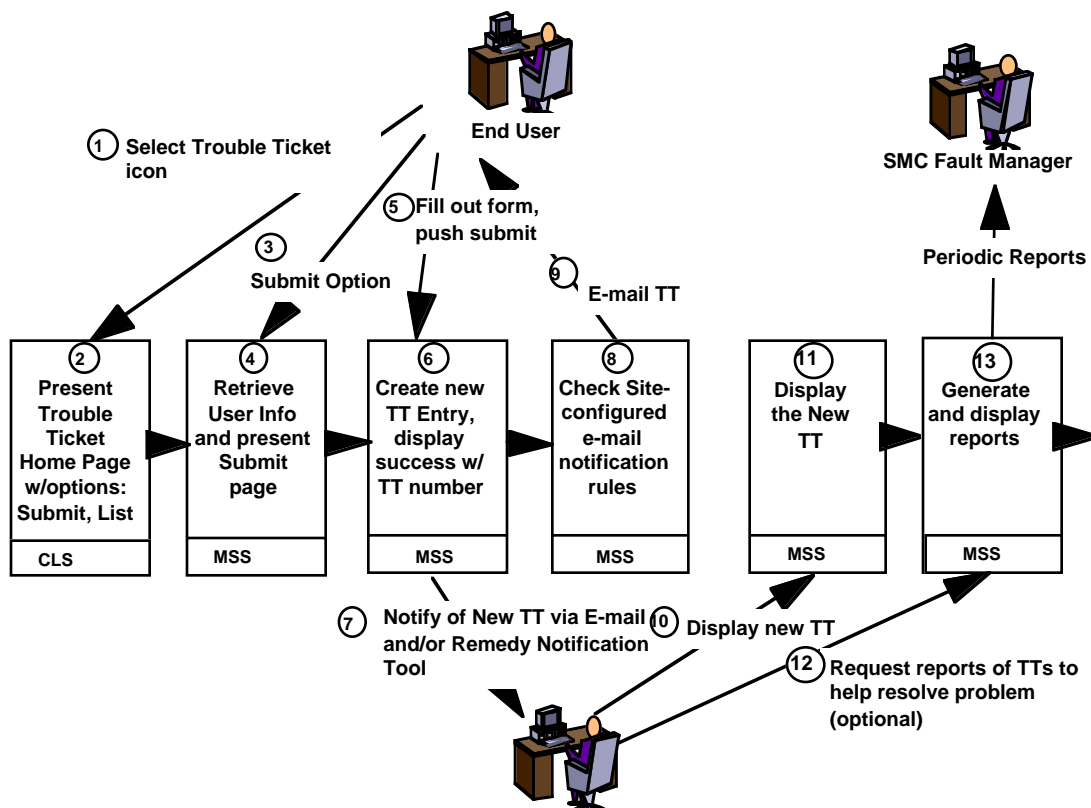


Figure 5.2.6.1-1. Trouble Ticket Functional Flow (1 of 3)

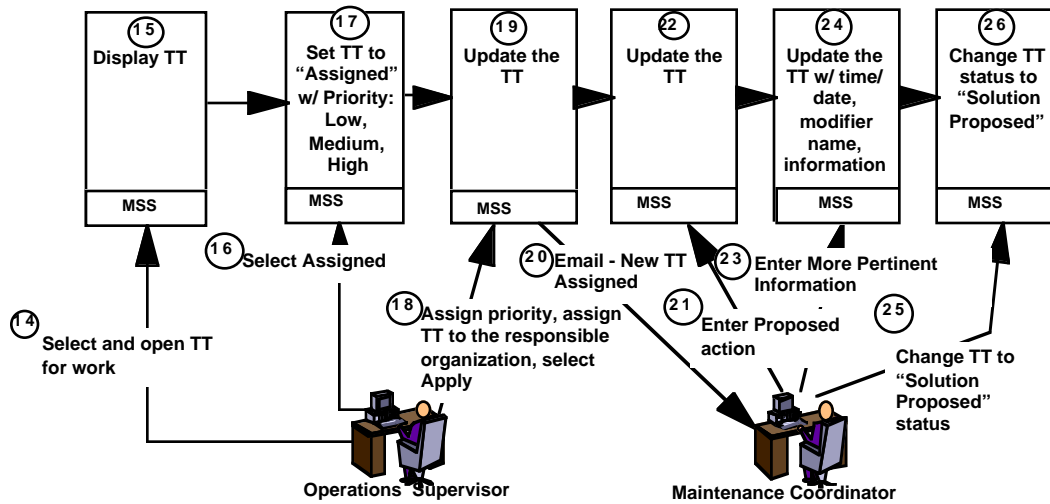


Figure 5.2.6.1-2. Trouble Ticket Functional Flow (2 of 3)

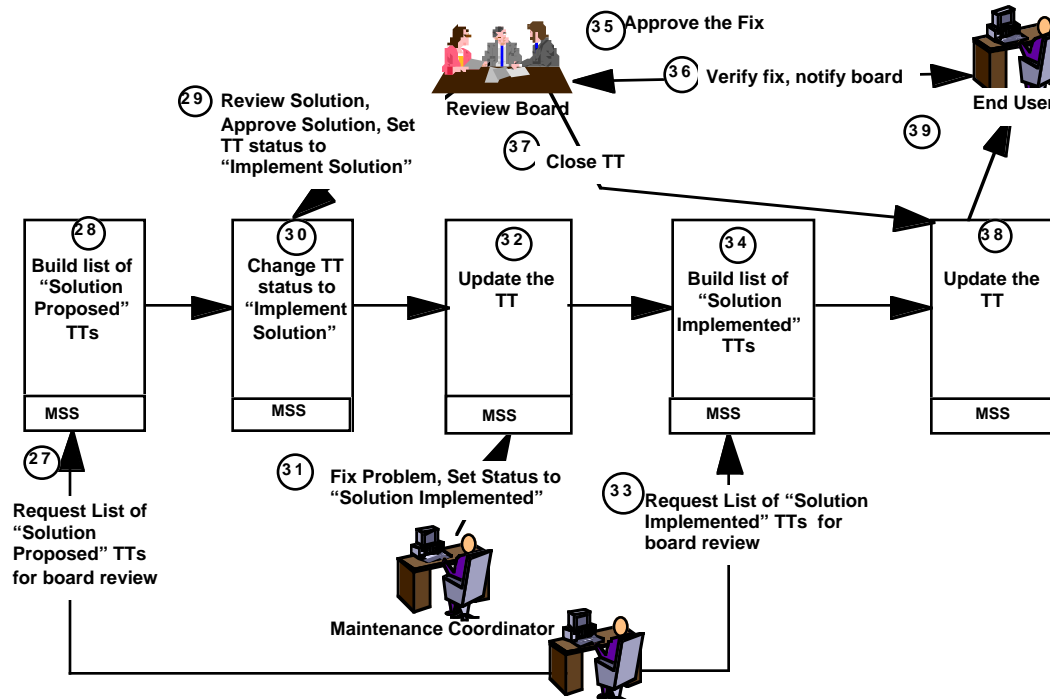


Figure 5.2.6.1-3. Trouble Ticket Functional Flow (3 of 3)

5.2.6.2 Operator Roles

Operations Supervisor: The Operations Supervisor ensures that all operations staff adhere to established policies, procedures, and schedules, provides direction and assistance to "on-line" operations staff as needed and provides reports to management as required. The Operations Supervisor is responsible for overall performance and utilization of both operations staff and resources, serves as the focal point for all operations related problems and assigns and prioritizes all problem investigation and resolution activities in consultation with management.

Maintenance Coordinator -The Maintenance Coordinator is the principal commercial off-the-shelf (COTS) HW and software (SW) maintenance resource at the DAAC. This individual functions as the site's maintenance engineer in cases where a failed component is to be repaired using a self-maintenance approach. If outside maintenance support from a contracted maintenance vendor or the original equipment manufacturer (OEM) is to be used, the DAAC Maintenance Coordinator coordinates the maintenance action. Prior to, during and upon completion of any maintenance action, the DAAC Maintenance Coordinator will interface with the Management Subsystem (MSS) for recording and monitoring maintenance actions.

5.2.6.3 Detailed Points of View

The first Points of View diagram (Figure 5.2.6.3-1) depicts the interaction between the end user and the ECS Subsystems when a problem occurs. This process includes detection of the problem, creating a TT, and submitting the TT to the Operations Supervisor.

The second Points of View diagram (Figure 5.2.6.3-2) describes the process the Operations Supervisor performs once a TT is received. This process includes reviewing the initial TT, generating reports lists of current and past TTs and assigning the TT to the responsible organization (e.g. Maintenance Coordinator).

The third Points of View diagram (Figure 5.2.6.3-3) describes the role the TT Review Board once a TT is received. This process includes review of the initial assessment and recommended resolution from the Maintenance Coordinator, evaluation of the long term affects of the proposed solution culminating in either approval to proceed or rejection of the proposed solution.

The final Points of View diagram (Figure 5.2.6.3-4) depicts the process required to close the TT. Once the Maintenance Coordinator fixes the problem, the TT is updated, the TT Review Board is notified, the end user verifies the fix, and the TT Review Board closes the TT.

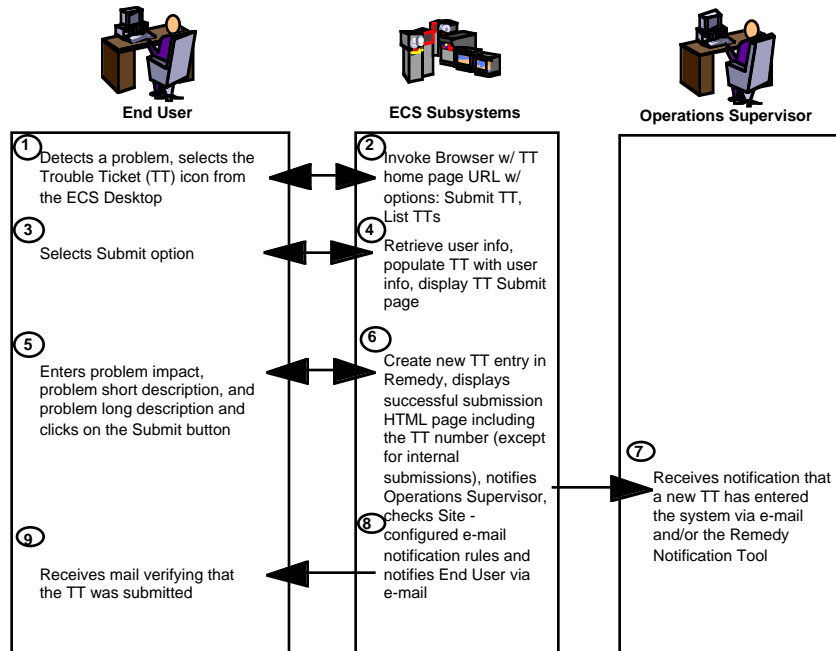


Figure 5.2.6.3-1. Trouble Ticket Points of View (1 of 4)

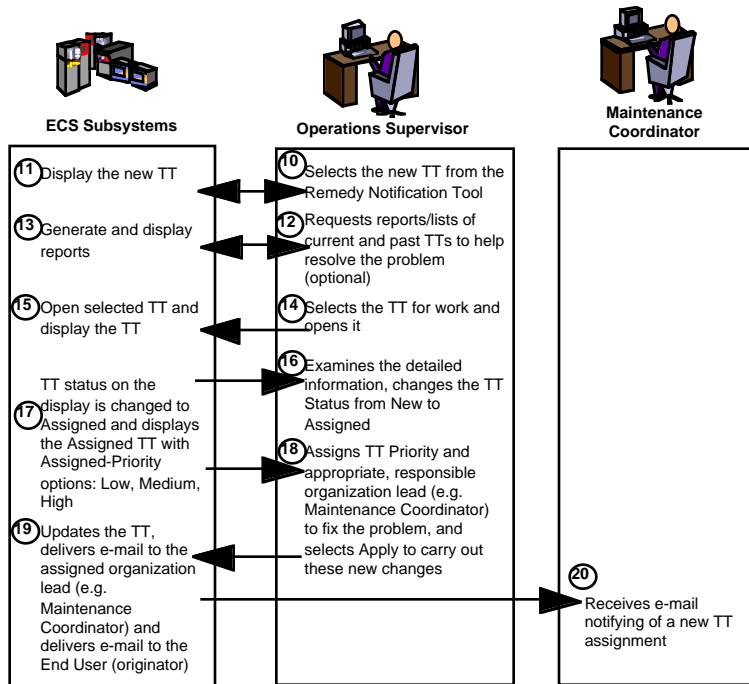


Figure 5.2.6.3-2. Trouble Ticket Points of View (2 of 4)

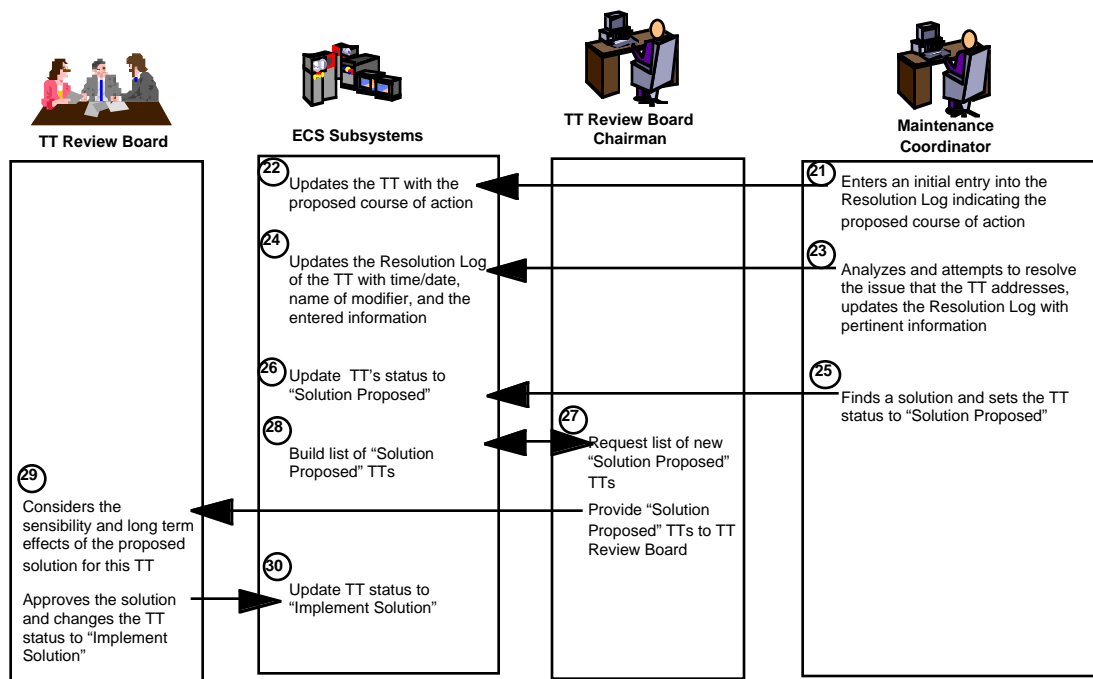


Figure 5.2.6.3-3. Trouble Ticket Points of View (3 of 4)

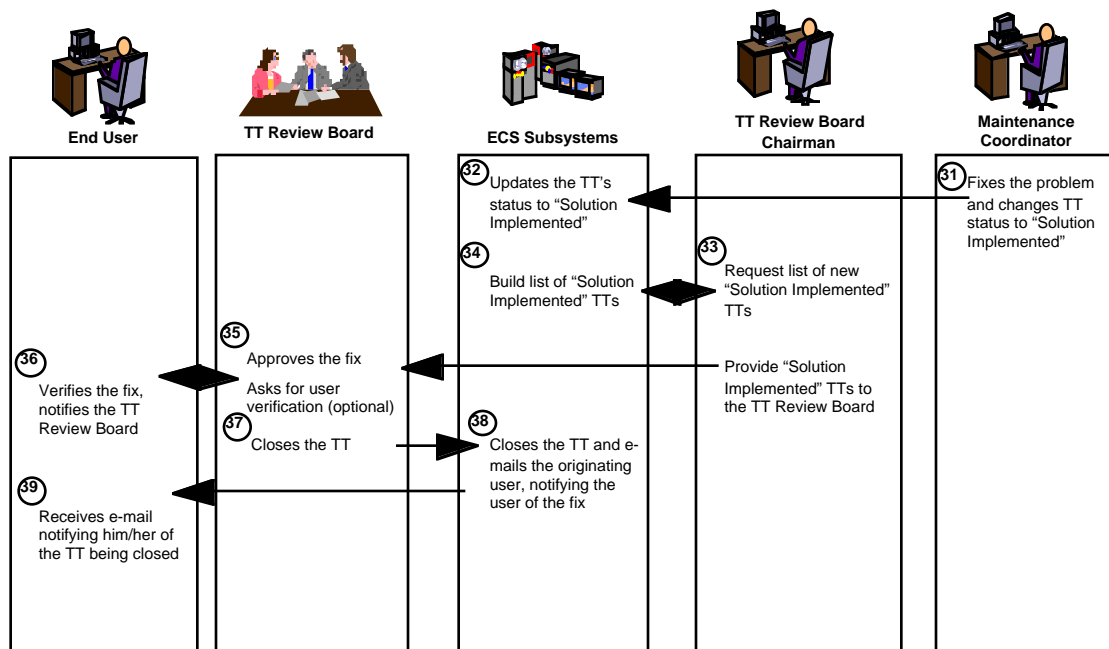


Figure 5.2.6.3-4. Trouble Ticket Points of View (4 of 4)

This section is continued on the next page.

5.2.6.4 TT Submission/Resolution End User

The End User (i.e. the TT originator) workflows (Figures 5.2.6.4-1 through 5.2.6.4-3) describe the steps that the End User must make in order to report a Trouble Ticket. After detecting a problem, the user accesses the TT form and populates the appropriate fields with data as well as a complete detailed description of the problem. Once completed and submitted, an e-mail message is automatically sent to the Operations Supervisor.

Workflow

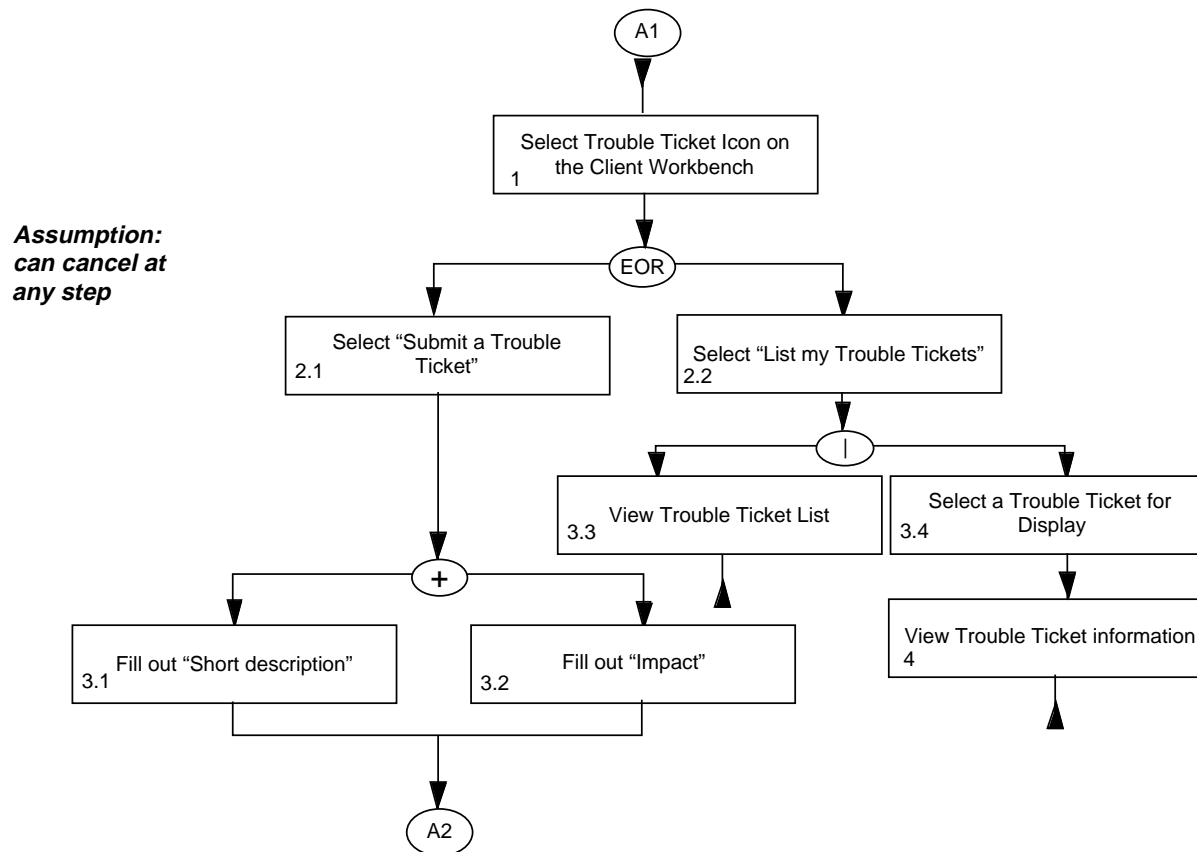


Figure 5.2.6.4-1. TT Submission/Resolution-End User Workflow (1 of 3)

Workflow

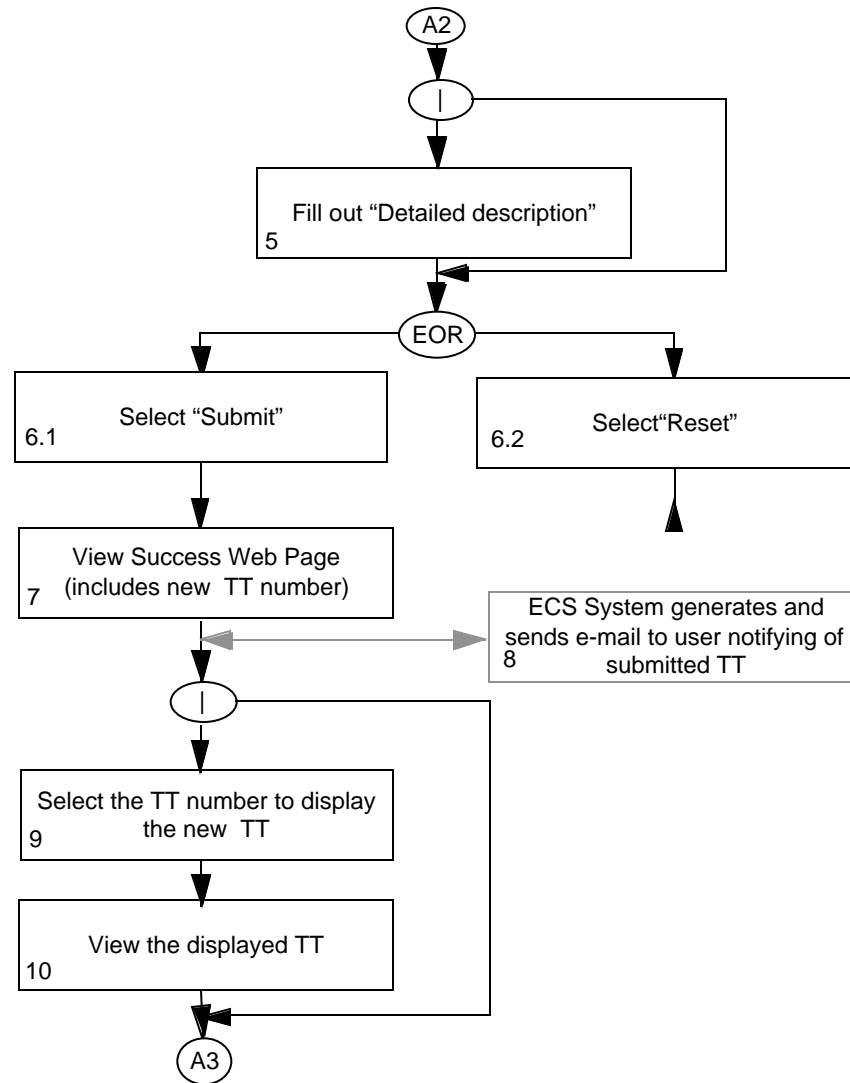


Figure 5.2.6.4-2. TT Submission/Resolution-End User Workflow (2 of 3)

Workflow

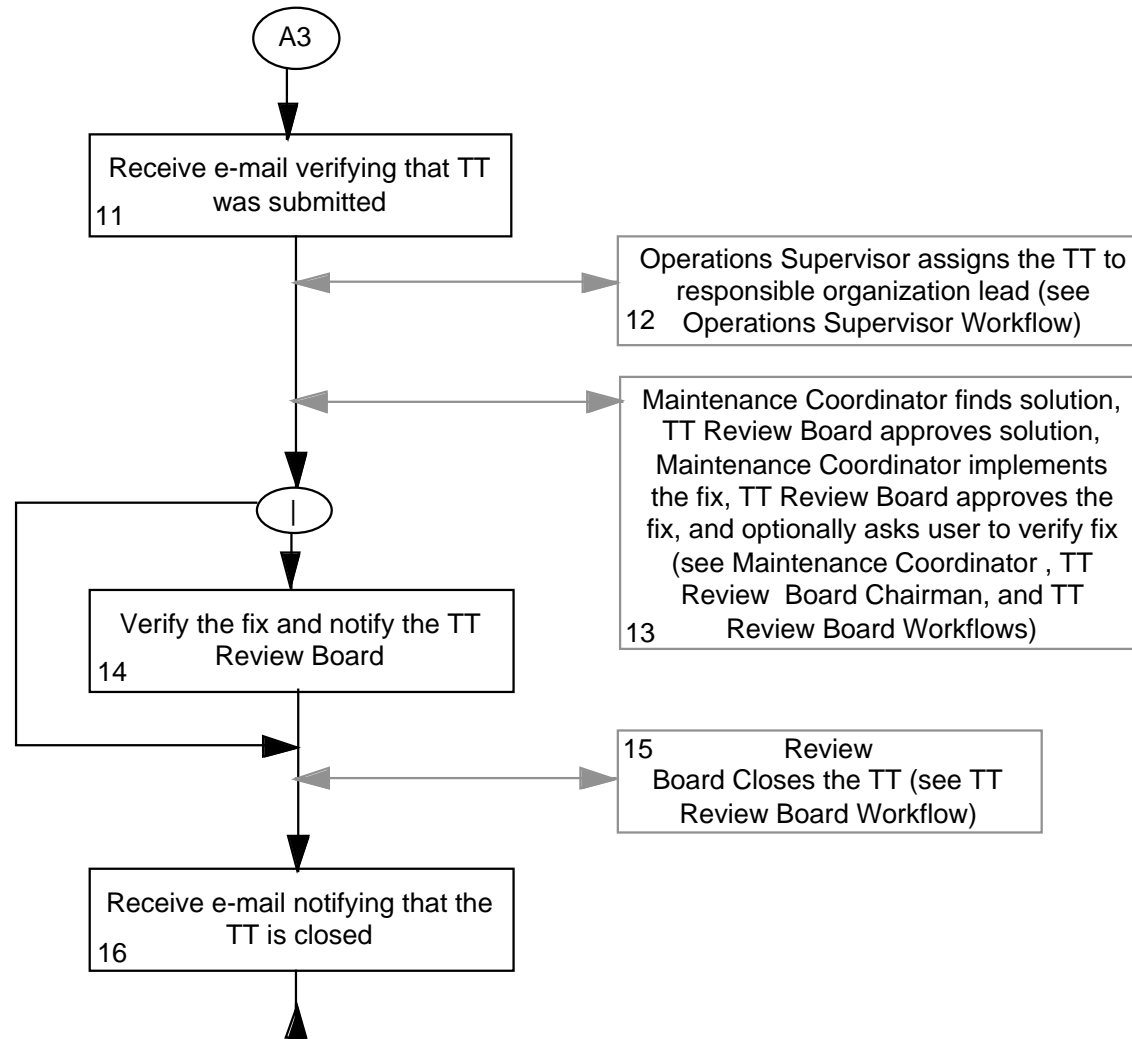


Figure 5.2.6.4-3. TT Submission/Resolution-End User Workflow (3 of 3)

Data Activity

Table 5.2.6.4-1. Data Activity for TT End User

Object/ Tool Name	Data Element	Activity																				
		1	2.1	2.2	3.1	3.2	3.3	3.4	4	5	6.1	6.2	7	8	9	10	11	12	13	14	15	16
MsTtManager	Short Problem Description				I				D							D						
	Long Problem Description								D							D						
	Submitter Impact					I			D	I						D						
	Submitter's User ID								D							D						
	Submitter's Name								D							D						
	Submitter's Phone #								D							D						
	SubmittersEmail Addr								D							D						
	TT Number								D							D						
	TT Status								D							D						
	TT Assigned Priority								D							D						
	Resolution Log								D							D						
	TT Creation Date								D							D						
	Submitter's Home Site								D							D						
	Proposed Solution								D													
	Assigned Technician's User ID								D													
	Related CCR								D													
	Keywords Assigned								D													
	Closing Code								D													
	Software Resource Affected								D													
	Hardware Resource Affected								D													
	Forwarded Site Names								D													
	Any Combination of fields								D													
	History Log								D													
	Close Date								D													
	Closed-by (user ID)								D													
	Forwarded Date								D													
	Forwarded From								D													
	TT List							D								D						

5.2.6.5 TT Submission/Resolution Operations Supervisor

The Operations Supervisor workflows (Figures 5.2.6.5-1 through 5.2.6.5-3) describe the steps that the Operations Supervisor must make in order to process a Trouble Ticket. After receiving the e-mail message the Operations Supervisor will access the TT via Remedy application, review the detailed problem description and assign priority and responsibility for the TT. Once assigned, the responsible organization (e.g. Maintenance Coordinator) will be informed via e-mail and will start problem resolution.

Workflow

**Assumption:
can cancel at
any step**

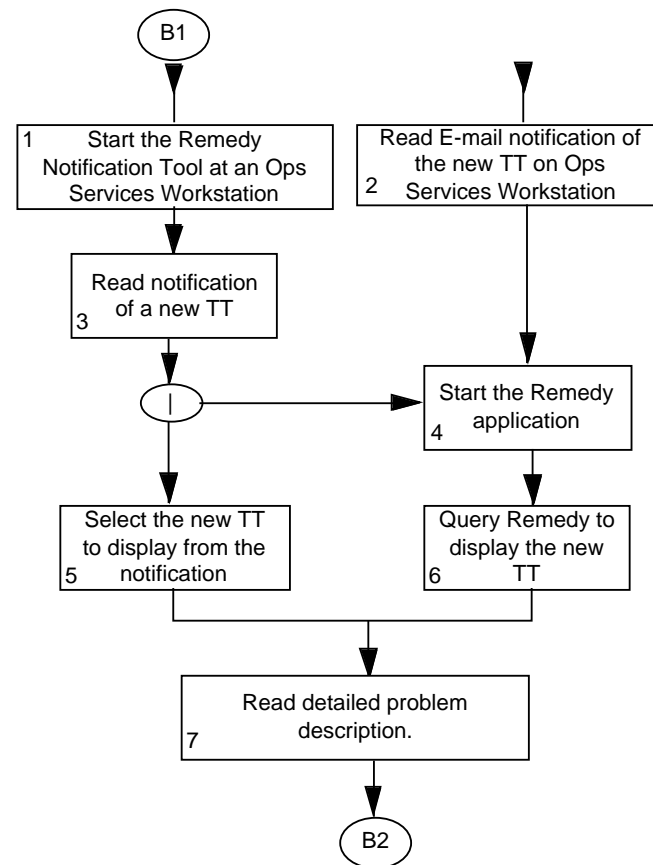


Figure 5.2.6.5-1. TT Submission/Resolution-Operations Supervisor Workflow (1 of 3)

Workflow

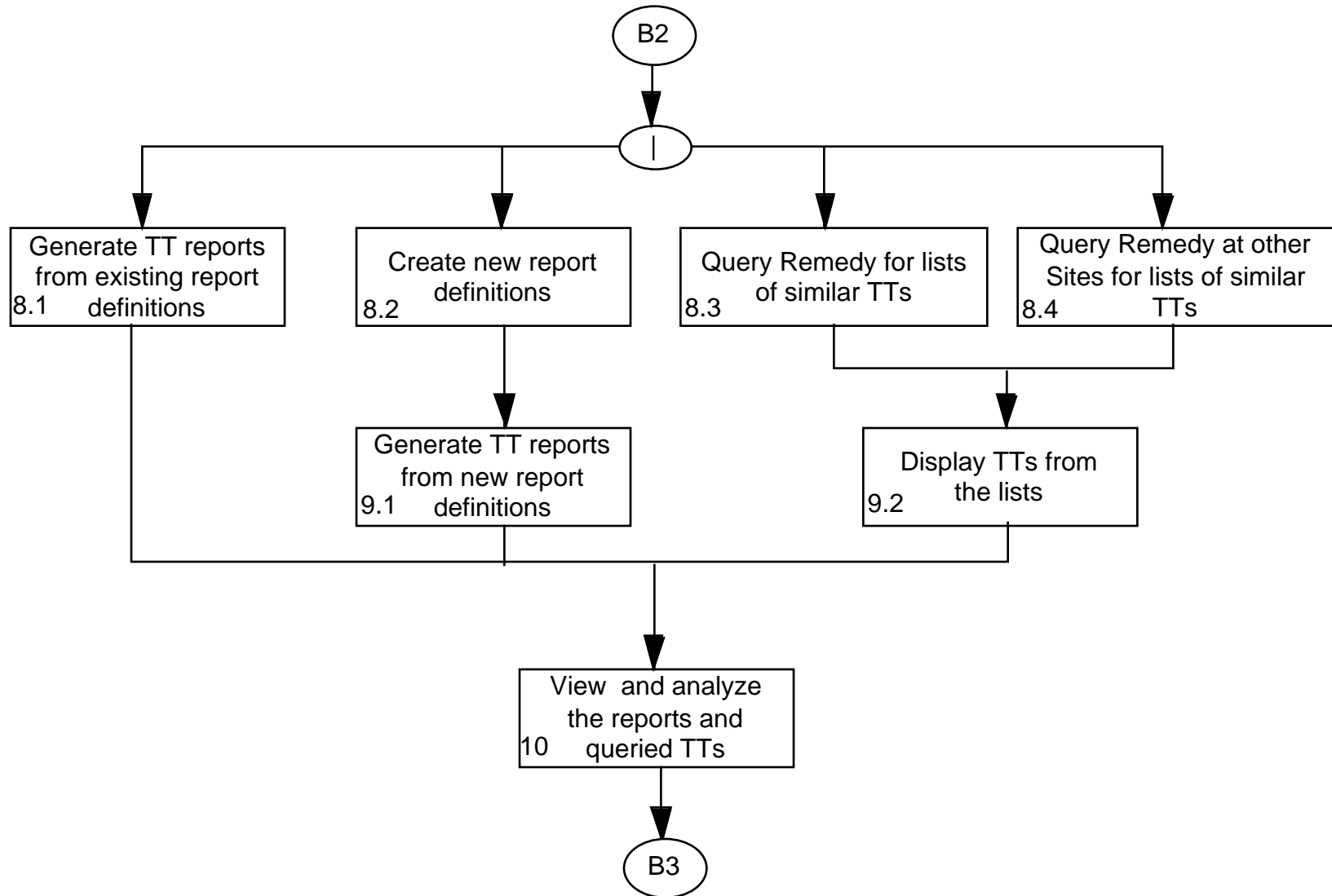


Figure 5.2.6.5-2. TT Submission/Resolution-Operations Supervisor Workflow (2 of 3)

Workflow

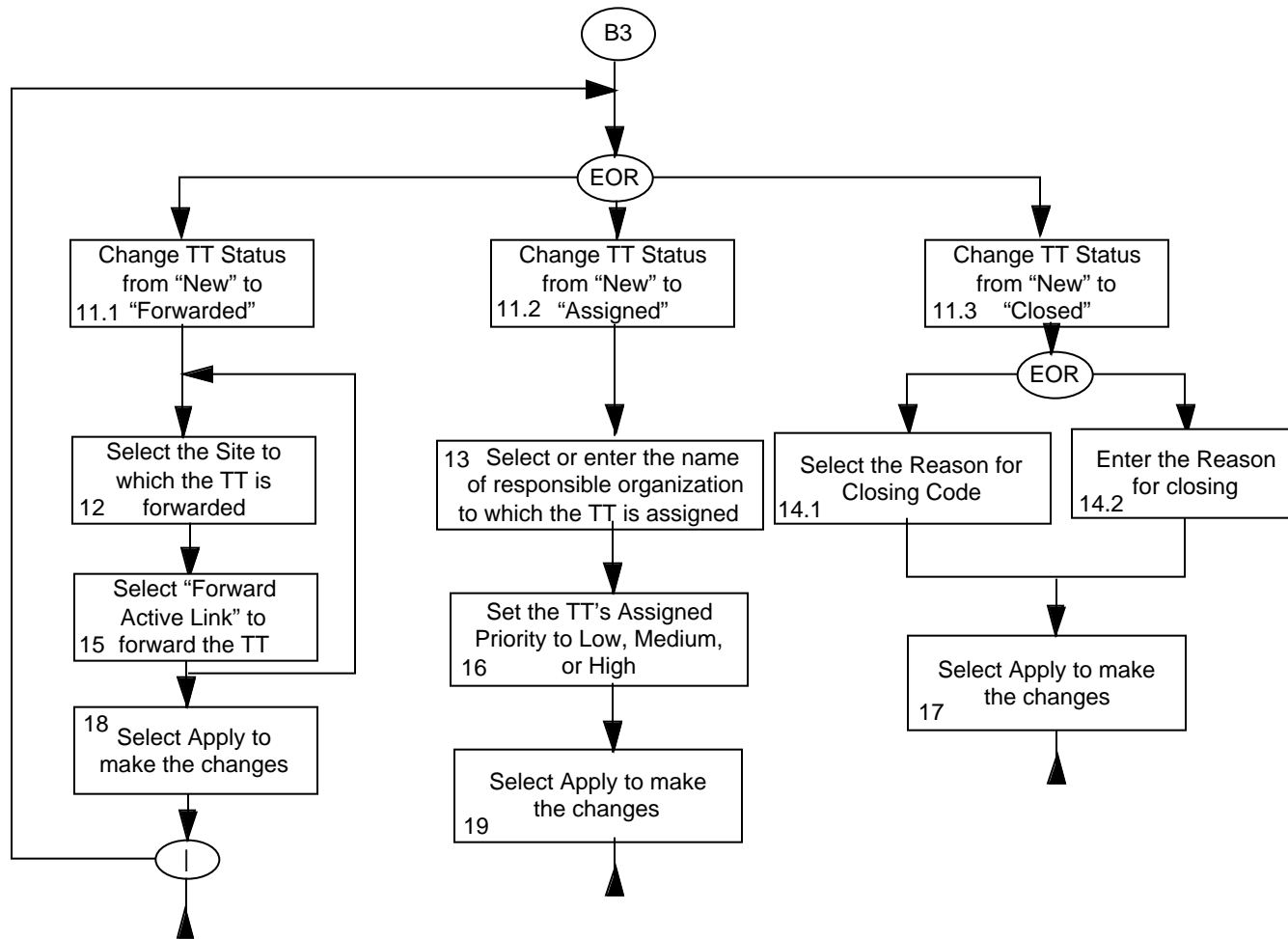


Figure 5.2.6.5-3. TT Submission/Resolution-Operations Supervisor Workflow (3 of 3)

Data Activity

Table 5.2.6.5-1. Data Activity for TT Operations Supervisor

Object/ Tool Name	Data Element	1	2	3	4	5	6	7	8.3	8.4	9.2	10	12		14.1	14.2	15	16	17	18
MSITManager	Short Problem Description							D				D								
	Long Problem Description							D				D								
	Submitter Impact							D				D								
	Submitter's User ID							D				D								
	Submitter's Name							D				D								
	Submitter's Phone #							D				D								
	SubmittersEmail Addr							D				D								
	TT Number											D								
	TT Status											D								
	TT Assigned Priority											D						I		
	Proposed Solution											D								
	TT Creation Date											D								
	Submitter's Home Site											D								
	Resolution Log											D								
	Assigned Technician's User ID											D								
	Related CCR											D								
	Keywords Assigned											D								
	Closing Code & Reason											D			I	I				
	Software Resource Affected											D								
	Hardware Resource Affected											D								
	Forwarded Site Names											D	I							
	Any Combination of fields											D								
	History Log											D								
	Close Date											D								
	Closed-by (user ID)											D								
	Forwarded Date											D								
	Forwarded From											D								
	TT List					D			D	D	D	D								

5.2.6.6 TT Submission/Resolution Maintenance Coordinator

The Maintenance Coordinator workflows (Figures 5.2.6.6-1 through 5.2.6.6-3) describe the steps that the assigned responsible organization lead, who in our example is the Maintenance Coordinator, will perform in order to resolve and implement the required corrective actions for a given Trouble Ticket. After receiving the e-mail message from the Operations Supervisor, the Maintenance Coordinator will review the TT, make an initial assessment as to the type of problem (i.e. software, hardware), analyze the problem to determine the best approach for resolution and provide the recommendation to the TT Review Board. After approval to implement the solution, the Maintenance Coordinator will implement the solution, update the TT and inform the TT Review Board of the results.

Workflow

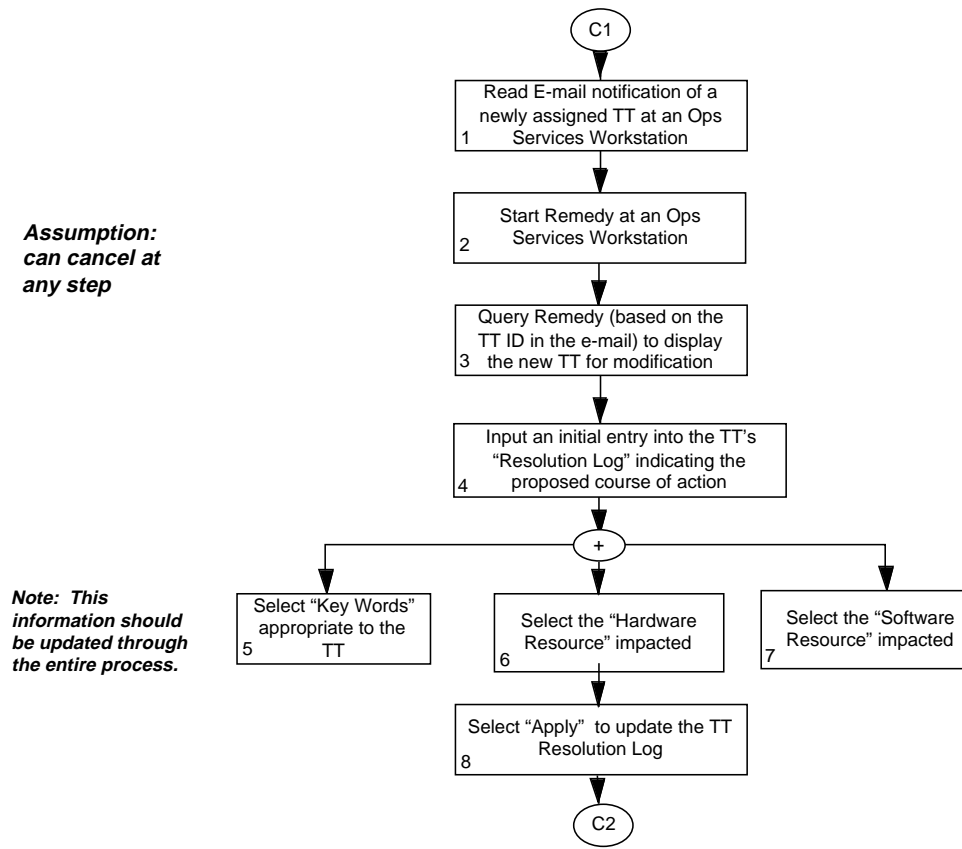


Figure 5.2.6.6-1. TT Submission/Resolution-Maintenance Coordinator Workflow (1 of 3)

Workflow

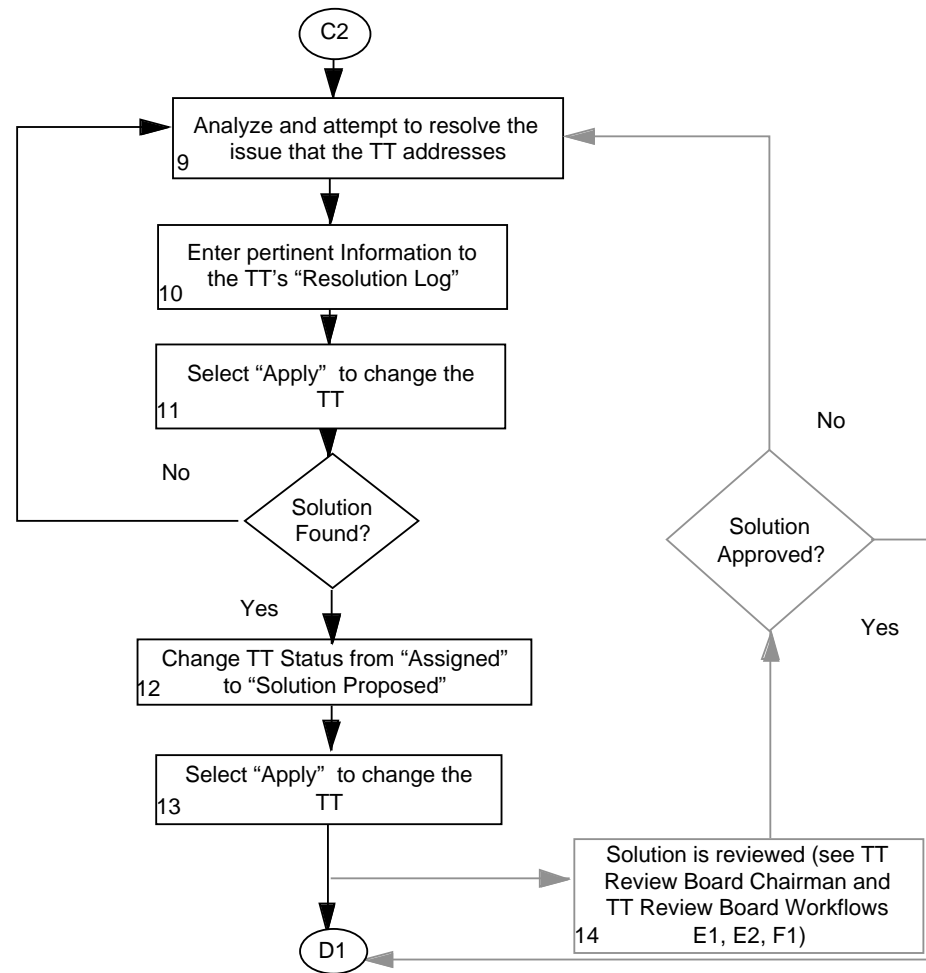


Figure 5.2.6.6-2. TT Submission/Resolution-Maintenance Coordinator Workflow (2 of 3)

Workflow

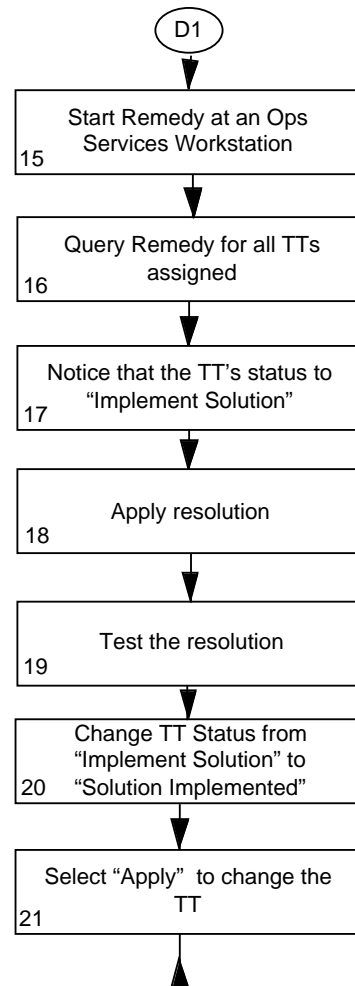


Figure 5.2.6.6-3. TT Submission/Resolution-Maintenance Coordinator Workflow (3 of 3)

Data Activity

Table 5.2.6.6-1. Data Activity for Maintenance Coordinator

Object/ Tool Name	Data Element	Activity																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MsTtManager	Short Problem Description																					
	Long Problem Description																					
	Submitter Impact																					
	Submitter's User ID																					
	Submitter's Name																					
	Submitter's Phone #																					
	SubmittersEmail Addr																					
	TT Number																					
	TT Status												I					D			I	
	TT Assigned Priority																					
	TT Creation Date																					
	Submitter's Home Site																					
	Resolution Log				I						I											
	Assigned Technician's User ID																					
	Related CCR																					
	Keywords Assigned					D																
	Closing Code																					
	Software Resource Affected							D														
	Hardware Resource Affected						D															
	Forwarded Site Names																					
	Any Combination of fields																					
	History Log																					
	Close Date																					
	Closed-by (user ID)																					
	Forwarded Date																					
	Forwarded From																					
	TT List			D													D					

This section is continued on the next page.

5.2.6.7 TT Submission/Resolution TT Review Board Chairman

The TT Review Board Chairman workflows (Figures 5.2.6.7-1 through 5.2.6.7-2) describe the steps that the Review Board Chairman will perform in order to process and resolve a TT. This highly iterative process requires that the TT Review Board Chairman review the initial proposed solution, evaluate the proposed solution, inform the board for further evaluation, provide approval or rejection of the proposed resolution method to the Maintenance Coordinator, and once the TT is resolved, provide closure to the TT.

Workflow

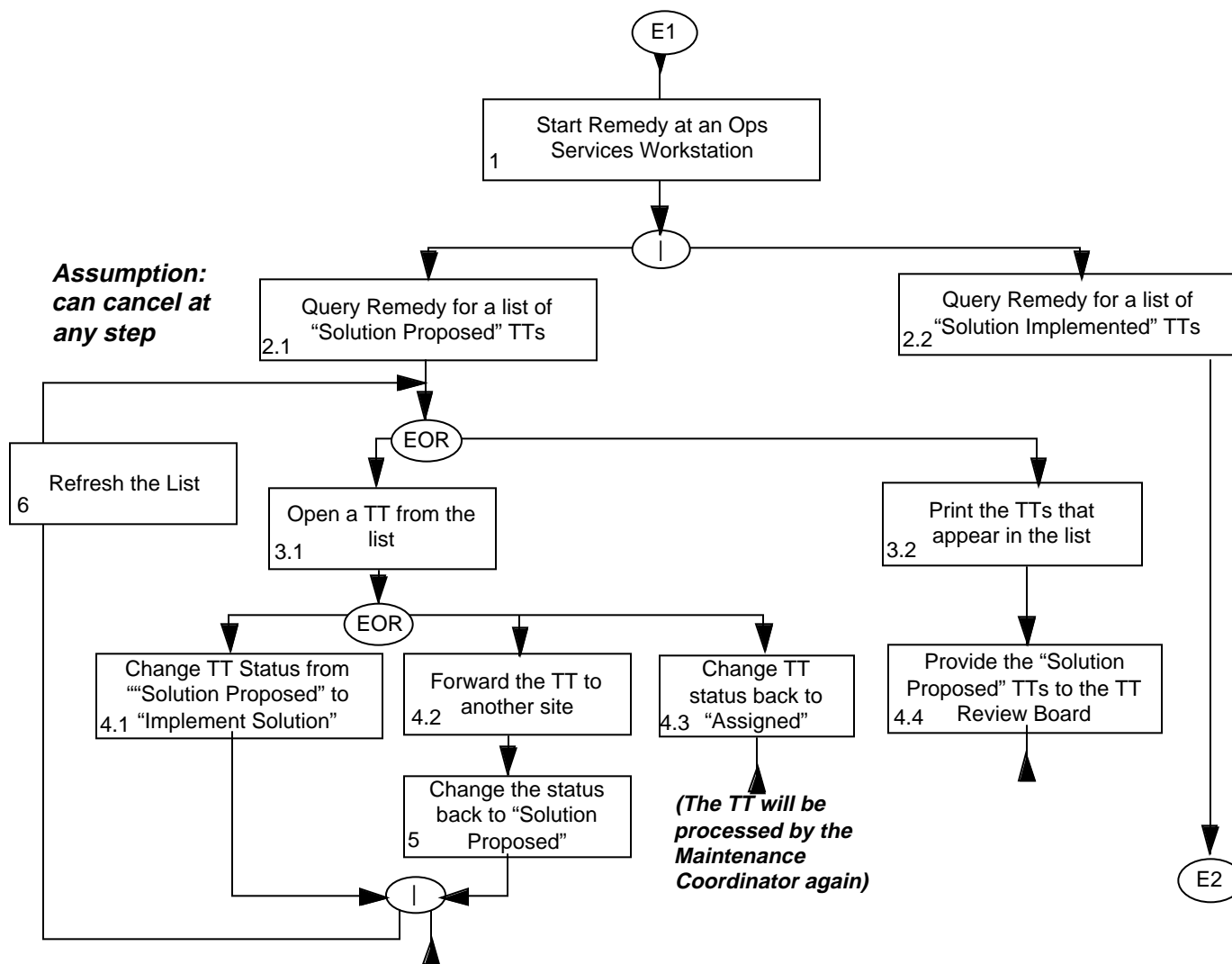


Figure 5.2.6.7-1. TT Submission/Resolution-TT Review Board Chairman Workflow (1 of 2)

Workflow

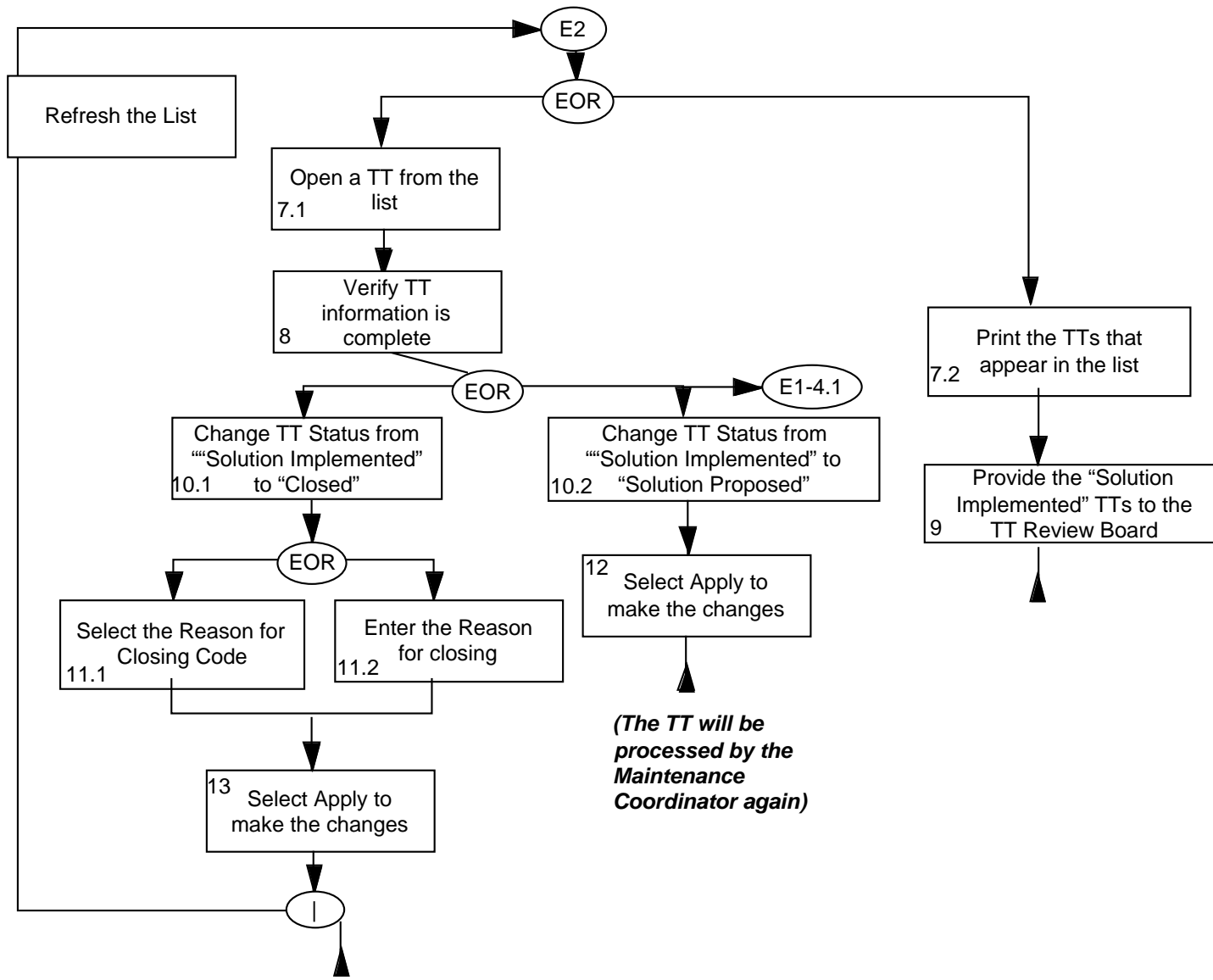


Figure 5.2.6.7-2. TT Submission/Resolution-TT Review Board Chairman Workflow (2 of 2)

Data Activity

Table 5.2.6.7-1. T Data Activity for T Review Board Chairman

Object/ Tool Name	Data Element	Activity																			
		1	2.1	2.2	3.1	3.2	4.1	4.2	4.3	4.4	5	6	7.1	7.2	9	10.1	10.2	11.1	11.2	12	13
MsTtManager	Short Problem Description				D								D								
	Long Problem Description				D								D								
	Submitter Impact				D								D								
	Submitter's User ID				D								D								
	Submitter's Name				D								D								
	Submitter's Phone #				D								D								
	SubmittersEmail Addr				D								D								
	TT Number				D								D								
	TT Status				D		I		I		I		D			I	I				
	TT Assigned Priority				D								D								
	TT Creation Date				D								D								
	Submitter's Home Site				D								D								
	Resolution Log				D								D								
	Assigned Technician's User ID				D								D								
	Related CCR				D								D								
	Keywords Assigned				D								D								
	Closing Code				D								D					I	I		
	Software Resource Affected				D								D								
	Hardware Resource Affected				D								D								
	Forwarded Site Names				D								D								
	Any Combination of fields				D								D								
	History Log				D								D								
	Close Date				D								D								
	Closed-by (user ID)				D								D								
	Forwarded Date				D								D								
	Forwarded From				D								D								
	TT List		D	D	D								D								

5.2.6.8 TT Submission/Resolution TT Review Board

The TT Review Board workflows (Figures 5.2.6.8-1 through 5.2.6.8-3) describe the steps that the Review Board will perform in order to process and resolve a TT. This highly iterative process requires that all TTs be reviewed by the TT Review Board. The process includes a review of the initial problem assessment, evaluating the proposed solution and directing the Maintenance Coordinator to either proceed or re-evaluate the problem. Once the TT is resolved, the TT status is updated and closed.

Workflow

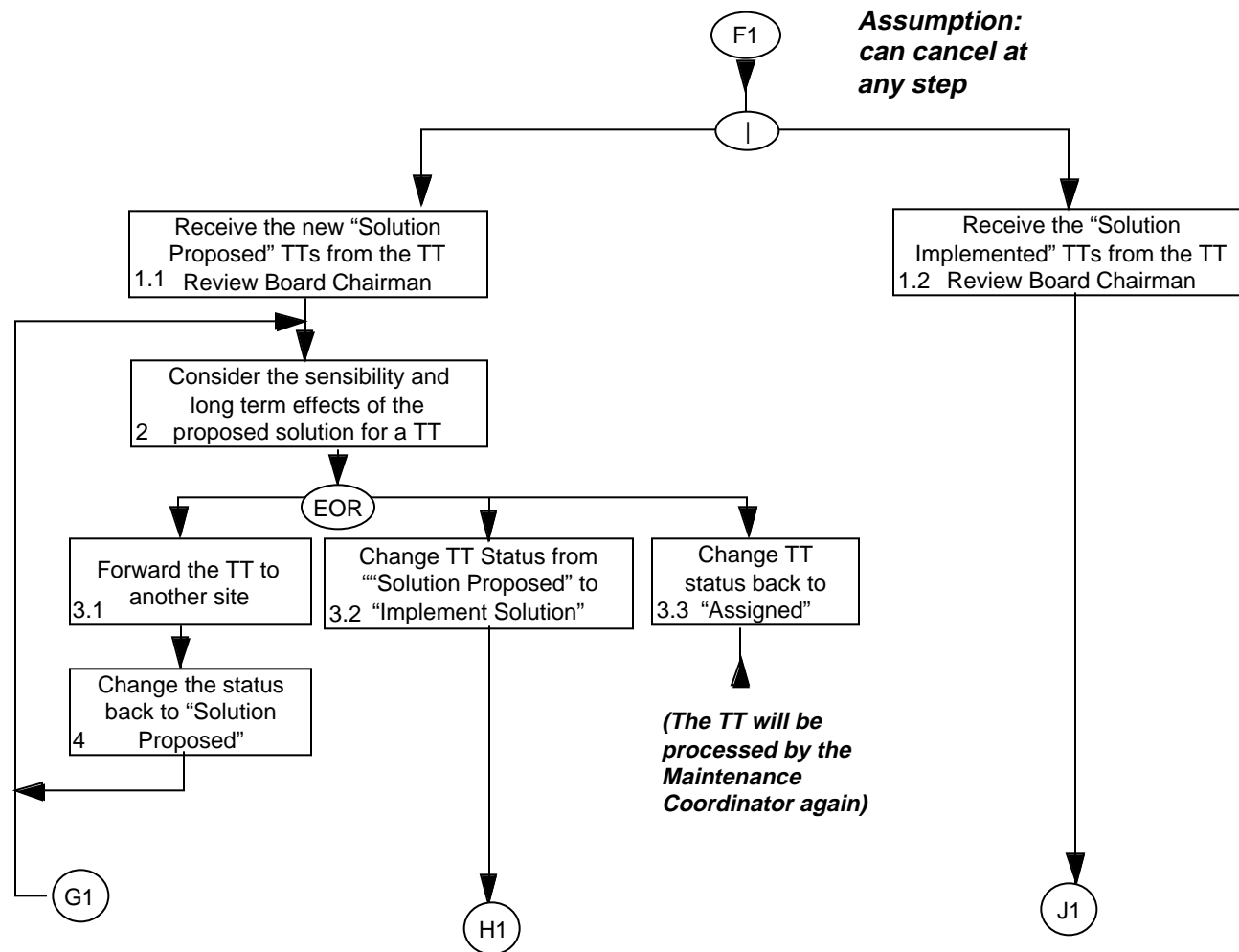


Figure 5.2.6.8-1. TT Submission/Resolution-TT Review Board Workflow (1 of 3)

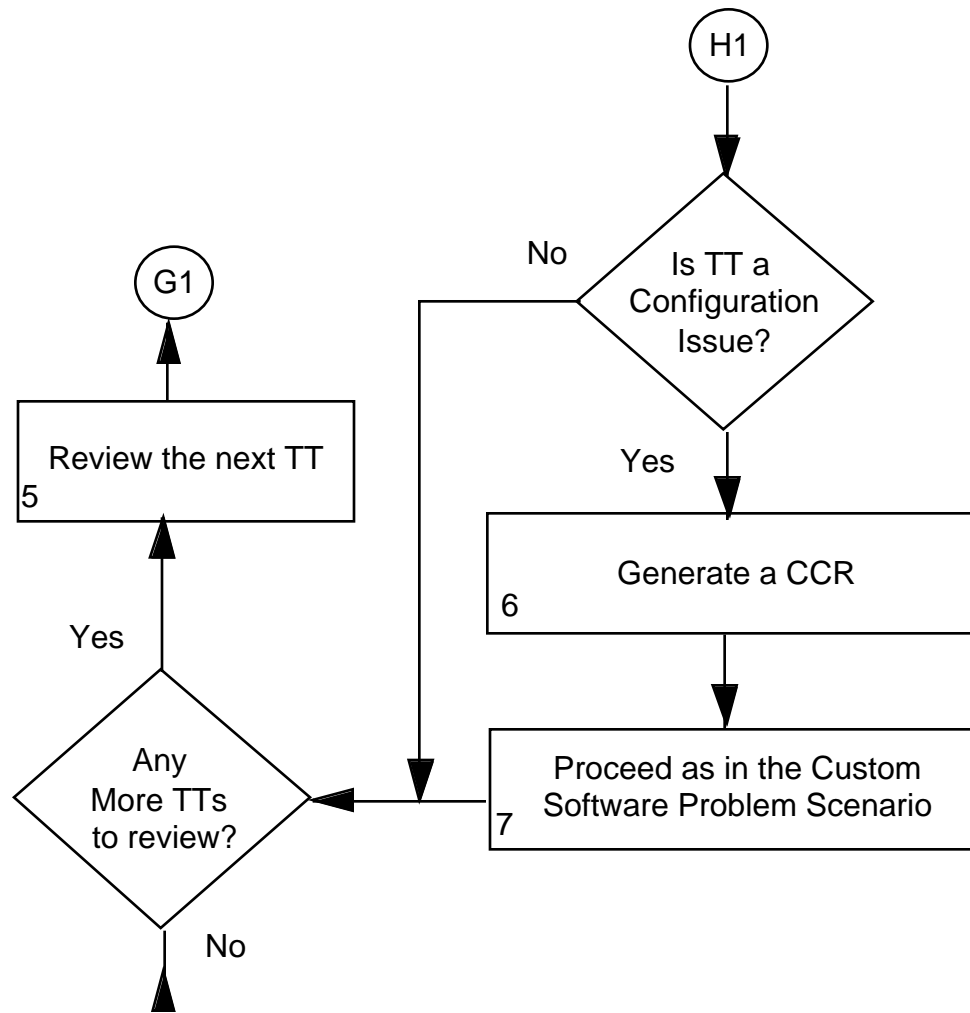


Figure 5.2.6.8-2. TT Submission/Resolution-TT Review Board Workflow (2 of 3)

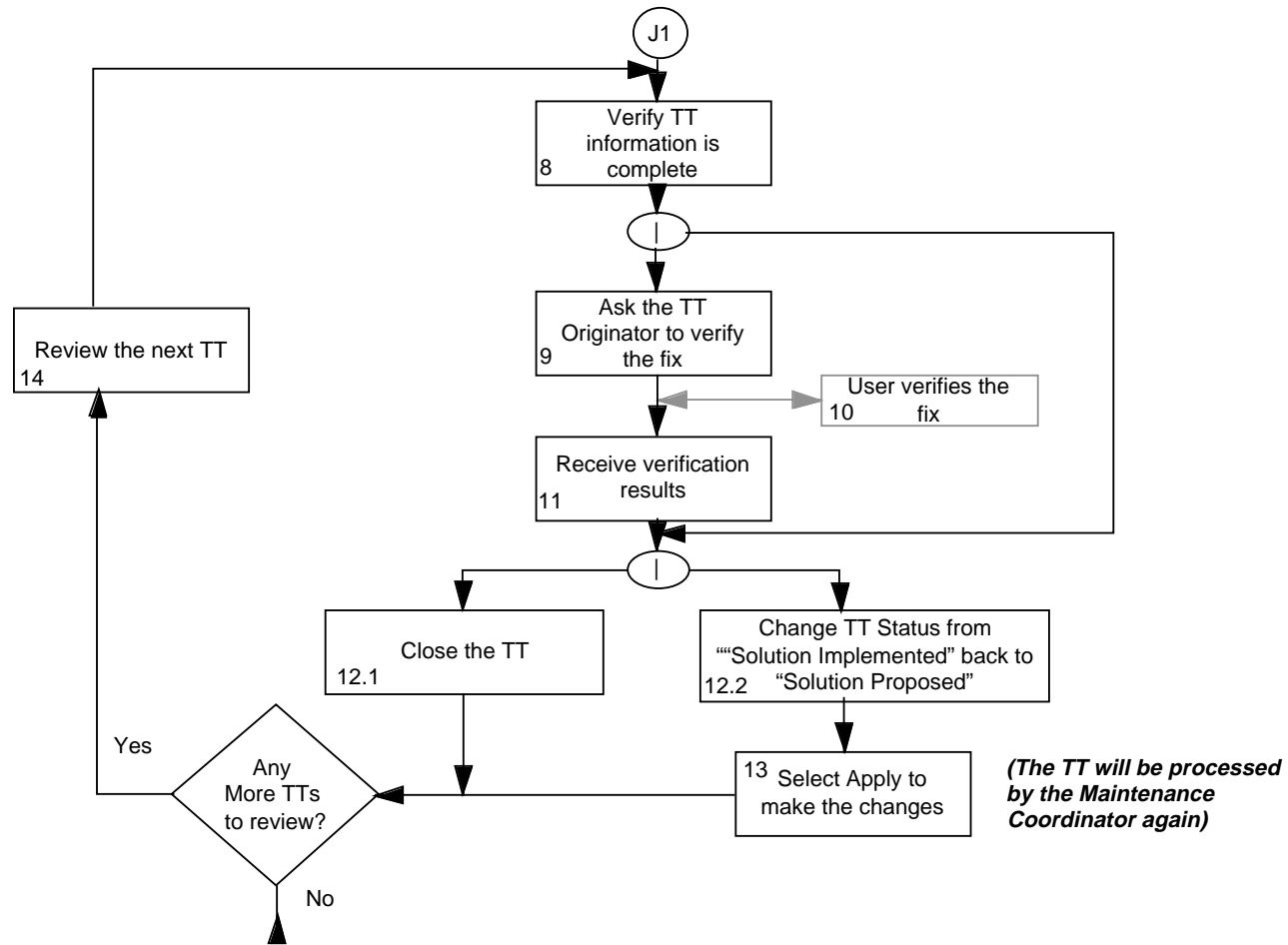


Figure 5.2.6.8-3. TT Submission/Resolution-TT Review Board Workflow (3 of 3)

Data Activity

Table 5.2.6.8-1. Data Activity for TT Review Board

Object/ Tool Name		Data Element	Activity																	
			1.1	1.2	2	3.1	3.2	3.3	4	5	6	7	8	9	10	11	12.1	12.2	13	14
MSITManager	Short Problem Description	D								D			D							D
	Long Problem Description	D								D			D							D
	Submitter Impact	D								D			D							D
	Submitter's User ID	D								D			D							D
	Submitter's Name	D								D			D							D
	Submitter's Phone #	D								D			D							D
	SubmittersEmail Addr	D								D			D							D
	TT Number	D								D			D							D
	TT Status	D				I	I	I		D			D							D
	TT Assigned Priority	D								D			D							D
	TT Creation Date	D								D			D							D
	Submitter's Home Site	D								D			D							D
	Resolution Log	D								D			D							D
	Assigned Technician's User ID	D								D			D							D
	Related CCR	D								D			D							D
	Keywords Assigned	D								D			D							D
	Closing Code	D								D			D							D
	Software Resource Affected	D								D			D							D
	Hardware Resource Affected	D								D			D							D
	Forwarded Site Names	D								D			D							D
	Any Combination of fields	D								D			D							D
	History Log	D								D			D							D
	Close Date	D								D			D				I			D
	Closed-by (user ID)	D								D			D					I		D
	Forwarded Date	D								D			D							D
	Forwarded From	D								D			D							D
	TT List	D								D			D							D

This page intentionally left blank.